

# Arboretum BULLETIN

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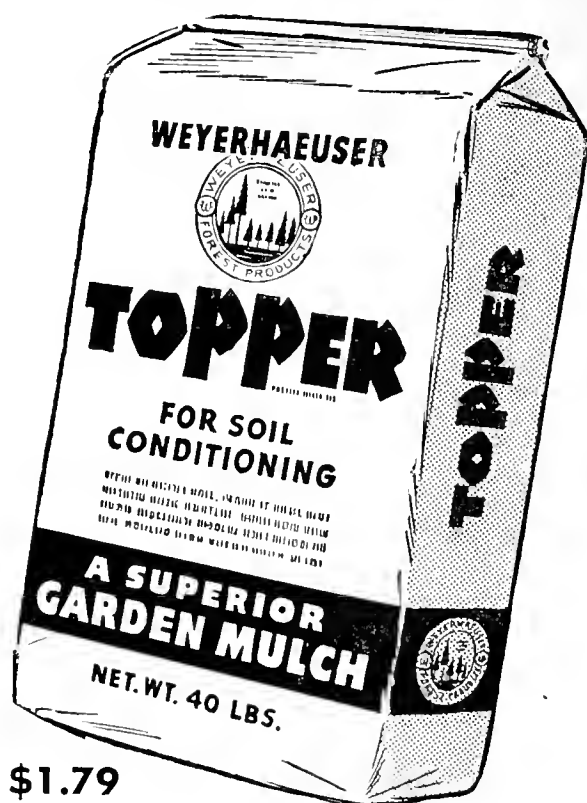
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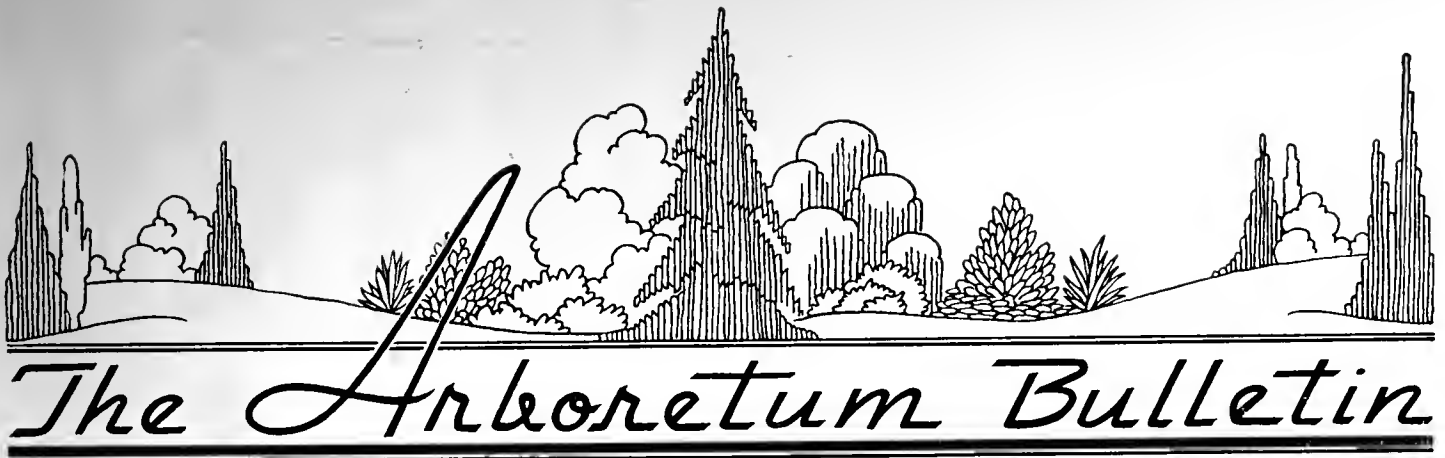
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VOLUME XII

SPRING, 1949

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## Winter in the Arboretum

B. O. MULLIGAN

OUR work and progress since November has been so much influenced by the abnormal weather it may be well to give a brief account of this before proceeding further.

November was wetter than usual (6.07 inches instead of a normal 5.03 inches of rain) but almost free from frosts, our lowest temperatures being 28 degrees F. on the 8th and 9th. From mid-December the weather became colder, the temperature falling to 19 or 20 degrees F. on three nights about Christmas; on the 22nd we had 2½ inches of snow. The month proved to be the coldest December since 1932 (mean temperature 39 degrees F.), although the rainfall (4.58 inches) was an inch less than normal. January, with a mean temperature of 33.6 degrees F., was the coldest since 1937. In the Arboretum, frost was recorded every morning except on the 6th and 7th, continuing to and including February 6. There were two distinct periods of low temperatures—the first on the 9th, 10th and 11th (15, 13 and 17 degrees F., respectively), the second on the 23rd, 24th and 25th (13, 10 and 12 degrees F.). Snow fell several times, totaling seven inches, but the month was the driest January ever known in Seattle, the rainfall being only 1.43 inches instead of a normal 4.94.

The principal results of this continued cold, dry and frosty weather were that work outdoors was confined to clearance of scrub and dead or dying trees, sawing of wood, etc., and

that no planting or preparation of ground was possible after the end of December.

However, judging by what has been accomplished in improvement of the north end since December 20, when we started on the banks of the lagoon opposite the entrance gate, such weather has been a help rather than a hindrance to us. In eleven working days, generally with eight men and using all available equipment, quantities of young alders and willows, mostly about seven years old, with an assortment of older trees—ash, maple and alder—were cleared, the tops burned and the trunks and main branches sawed up or removed, as were the extracted roots. It is now possible to obtain views north and west from the Arboretum and Broadmoor entrances and the road beside the lagoon which were previously entirely blocked, and even to glimpse the south end of Foster's Island as one comes 'round the bend by the oak collection. In this project Broadmoor residents have provided us with funds to support an extra man for three months, and the same fund will also cover the cost of hiring a bulldozer to grade the banks and make a level walk alongside the lagoon, an essential step which will be taken shortly. Two necessary tile drains from the road to the lagoon have already been laid and covered.

From there the crew went across the road into the oak section, partially cleared several years ago, and completed the unfinished work





by the same methods—pulling out large bushes and small trees with the winch on the large truck, felling trees in poor condition or those crowding better specimens, pruning off overhanging limbs and pulling smaller weed shrubs with a chain and tractor power. The effects of this operation can be easily seen from the Boulevard, where that side of the Arboretum has been considerably opened up to view, as far south as the bridge. The young oak trees here have been staked and tied where necessary and relabeled as far as possible. Some of them, badly situated, will have to be transplanted later in the year to better positions.

The next section to be dealt with was that between the picnic tables and Woodland Garden, part of which in the Olmsted plan is given up to the elm family. In this a large number of young alders and willows were rapidly growing up, old nut bushes annually increasing their area of occupation, and good ground being used by elders and cascara trees. Most of these have now been removed, with the exception of a few better examples of willow and cascara; many young seedling dogwoods (*Cornus Nuttallii*) and western cedar (*Thuja plicata*) have been retained, as well as half a dozen small and stunted Sassafras trees discovered in the undergrowth. A trail will be made over this mound, and much of the natural vegetation allowed to continue. On the west side a promising sheltered site has been formed for a future garden of winter-flowering plants, and toward Azalea Way is a shady area where, after proper preparation, suitable azaleas, rhododendrons, enkianthus and other smaller woodland plants may find a home.

Thence to the south side of Woodland Garden, where the ground rises to a narrow ridge well covered by native trees. More necessary thinning and pruning has been done here, giving the best specimens and some young tulip, katsura and magnolia trees more space for development. Beyond this ridge is a shallow

valley, descending from the Upper Road by the magnolia collection to Azalea Way. Previously it had not been touched, and except for a path on either side was filled with sprawling vine maples, old nut bushes, cascara, willow and other trees, interlaced with a variety of brambles. Now it has been thoroughly opened up, displaying some fine Oregon maple, hemlock, *Thuja* and Douglas fir trees and showing the first promise of a splendid area for growing the larger rhododendrons in association with the tree species of *Magnolia*, *Embothrium*, *Styrax*, *Eucryphia* and similar flowering shrubs of the highest quality. The soil is light, sandy, and apparently well drained; cold air can flow down west to the Boulevard, so that excessive frost will not be held here.

Other lesser cleaning-up operations have been in the shrubby honeysuckle section between the Boulevard and Azalea Way, in and around the pond west of the Boulevard for the Christmas tree lighting, and thinning of the bank of Spanish broom (*Spartium*) beside the Upper Road opposite the nursery.

During December beds were dug for a new camellia garden immediately to the south of Rhododendron Glen, an area previously occupied by the mock oranges (*Philadelphus*) which are now being moved elsewhere. The plan for this garden, which it is hoped to plant during March with the bulk of our young and surplus stock, has been drawn up by Mr. Hansen according to color and habit of the varieties; it will extend back to the rhododendrons above the glen and thus form a complete enclosure almost entirely devoted to camellias, save for a few specimen flowering trees. One new bed for azaleas has been commenced on the east side of Azalea Way to the north of Woodland Garden, and should be planted during the spring, probably with the new variety "Joya."

A temporary nursery for some members of the *Saxifragaceae* family (*Philadelphus*, *Deutzia* and *Ribes* species) was made and planted during early winter immediately to the south of the nursery proper; here the plants can remain for a further year until the adjacent ground to the south is made ready for them.



View from north gate of Arboretum after clearance of lagoon banks.

—PHOTO BY E. F. MARTEN

Work in the greenhouses has included much seed sowing, transplanting of seedlings, potting on of older plants, and recently the preparation and fitting of a new set of frames for the propagating beds to replace the old covers.

A certain amount of planting was achieved during the last six weeks of 1948. Amongst the shrubby honeysuckles a number of replacements had to be made, and at the same time some additional species were set out—a total of twelve species and thirty-nine plants in all. On Azalea Way a fresh planting of *Rhododendron yedoense* var. *poukhanense* has been made near the north end; on the west side, about midway, more forsythias have been added to the earlier groups, and three young trees of *Magnolia obovata* (*hypoleuca*), donated by the Seattle Garden Club, placed farther to the north, together with three specimens of an unusual form of Western cedar (*Thuja plicata*) from British Columbia. In the *Viburnum* collection, close to the Boulevard, two groups of different species were planted. On Foster's Island some replacements were made amongst the pines and birches and additions made to both genera—in all, twenty-two plants of the former and eleven of the latter. In various places along or near the Upper Road more eucryphias, planes and katsura trees (*Cercidiphyllum*) are now placed. Additions have also been made to the conifers in the Pinetum and elsewhere, including hemlocks (*Tsuga*), three species, *Cryptomeria*, *Sequoia*, *Juniperus*, the weeping Norway spruce, and the rare *Libocedrus chilensis*.

Two generous gifts of daffodil bulbs from Campus Nursery, Inc., and Malmo Nurseries, have been planted respectively on the bank west of the Boulevard, a little south of the bridge, and at the north end of Azalea Way, where they should make a bright display this spring.

#### Acquisitions

##### (a) Seeds and Plants.

Besides these we have again received a variety of plants and seeds from many places and individuals. The Arnold Arboretum has sent us both plants and seeds, including crab-apples, forsythias, viburnums, maples and hollies; the Morris Arboretum at Philadelphia

has also been generous in supplying our requests in both forms. Plants have been purchased from English nurserymen—a collection of twenty-two kinds of roses, either species or old-fashioned kinds, and a varied assortment of rarities, amongst them *Camellias*, *Magnolia*, *Gordonia*, *Sorbus* and *Viburnum* species. Mr. Carl English, Jr., of Seattle, kindly presented us with fifty seedlings of *Metasequoia* to augment our small stock, as well as seedlings of *Magnolia salicifolia* and the California horse chestnut, and a considerable variety of personally gathered seeds of trees and shrubs from several western states. Seeds collected by Kingdon Ward in Manipur continue to reach us at intervals through the New York Botanical Garden, while the arboretum of the Missouri Botanical Garden supplied seeds of the uncommon *Juniperus formosana*. Many other very acceptable and interesting donations must be omitted for reasons of space, but the Arboretum is becoming more and more fortunate annually in its friends throughout the temperate world.

##### (b) Equipment

At the end of November the Arboretum received, through the good offices of the Arboretum Foundation from the profits of the Chrysanthemum Show, a heavy-duty loader for the Ford tractor. This, which is in the form of a large scoop, is mounted on a frame and normally hangs in the front of the tractor. It is operated hydraulically by the engine and can be elevated to a height of 16 feet. This new tool has already proved of great value, more especially for lifting heavy or awkward loads such as tree stumps into a truck, as well as large stones and soil, and is a very real saver of labor and time.

The Oregon-Washington Fertilizer Company gave us several loads of old superphosphate, and further supplies of hickory shavings are being regularly received from the Anderson and Thompson Ski Company. Such practical donations are both useful and welcome and are very gratefully accepted.

##### (c) Books

The library continues to increase in scope and usefulness. Additions during the last

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# The Royal Horticultural Society's Gardens Wisley, Surrey, England

N. K. GOULD\*

THE GARDENS of the Royal Horticultural Society are situated at Wisley, in the county of Surrey, twenty miles from London and within easy reach of the main London-Portsmouth road, but pleasantly separated from that busy highway by an area of well-wooded common land.

The original estate of sixty acres came into the Society's possession in 1904 through the generosity of Sir Thomas Hanbury after the death of its previous owner, Mr. G. F. Wilson, one of the most skilled amateur gardeners of his time. Mr. Wilson had developed there a wild garden and a series of ponds and streams around which he had established a variety of water-loving plants, foremost among them Japanese Irises.

The wild garden remains today, greatly improved by half a century's steady growth of trees and shrubs planted by its creator, and enriched by the gradual addition of many fine plants unknown in his day. Rhododendrons, Pieris, Vaccinium, Kalmias and other less spectacular Ericaceous plants revel in the moist, lime-free soil; and many other genera, notably Camellia, Magnolia, Stewartia and Styrax, assist in forming a flowery canopy beneath which there are many different Lilies, Primulas, Meconopsis and other herbaceous plants. *Narcissus cyclamineus* and *Gentiana asclepiadea* are among the species completely naturalized here, springing up everywhere from self-grown seeds; colonies of *Cyclamen neapolitanum* and *Shortia galacifolia* spread steadily, and among extensive drifts of *Cornus canadensis*, *Gaultheria procumbens* and similar carpeting plants one may discover thriving patches of *Schizocodon*, *Soldanella*, and other things of equal worth.

One of the aims of the Council of the Society, during its tenure of Wisley, has been to maintain collections of ornamental plants of

all kinds, as well as of vegetables and fruits, for the interest and instruction of its Fellows: with this end in view additional land has been acquired from time to time, so that the total area owned by the Society is now 250 acres.

One of the earliest improvements was the construction of a rock garden covering an area of one and a half acres on a hillside of north aspect, partly surrounded by trees and so designed as to merge naturally into its environment. The scree, bog and pools generally considered indispensable adjuncts of the large rock garden are all to be found here, and all parts are linked by winding paths and informal stone steps which facilitate inspection of the very wide range of saxatile plants growing here.

No class of plant is more adequately represented or attractively displayed at Wisley than the flowering trees and shrubs so popular at the present time in English gardens. Battleston Hill, a wooded ridge at the south side of the Gardens, acquired some ten years ago, has provided a home for a great assemblage of Rhododendrons. It is at a much higher level than the wild garden, and suffers less from late spring frosts which sometimes inflict serious injury on flowers and young growths in the lower parts of the gardens. All the most important species are planted here, and the generosity of Lord Aberconway, the Society's president, of Mr. J. B. Stevenson and other raisers of first-class hybrids, as well as many of our friends in the nursery trade, has made it possible for us to add the best modern varieties. A large area has been carpeted with drifts of the "Wilson Fifty" Kurume Azaleas.

A sloping, four-acre field adjoining the hill and facing the main road has recently been planted with the best of the Japanese Cherries, and in years to come should provide an outstanding spring display for visitors.

While the wild garden and Battleston Hill contain the woody plants whose preference is

\* Mr. N. K. Gould is botanist at the Royal Horticultural Society's Gardens, Wisley, England. His article is the ninth in our series on other outstanding arboreta and botanical gardens.





for semi-shade and peaty soil, the collections in the more open areas known as Seven Acres and Howard's Field demonstrate how much can be achieved by good cultivation on the sandiest of soils. Spacious beds and borders separated by wide grass walks reveal the extensive variety at the gardener's disposal in the more important genera such as the Lilacs, Roses, Prunus, Malus, Philadelphus and the hardy Heaths. The inclusion, in every case, of species as well as horticultural forms adds greatly to the interest of the collections. When the spring flowers are past and the superb display of autumnal colour has yet to come, interest is maintained in Seven Acres by an ornamental lake, an acre in extent, containing Waterlilies and fringed by many attractive moisture-loving herbaceous plants.

The pinetum, bordered by the slow-flowing river Wey, which joins the Thames a few miles from Wisley, is at all seasons a pleasant retreat where one may stroll on springy turf to enjoy the soft hues of Cypress, Cedar and Pine, genera represented by shapely specimens, mostly under fifty years old, of the species and varieties most suitable for use in the garden. Picea, Abies, Tsuga, Juniperus, and less familiar genera are to be found here, and it is hoped that it may be possible to establish the recently introduced Metasequoia, of which we have some lusty infants in their first year. Wild Hyacinths and Narcissi are naturalized in the grass, and groups of flowering Crabs contrast agreeably in spring with the more sombre tones of the evergreens. Scattered groups of Maple, Rhus, and Liquidambar provide splashes of vivid colour later in the year.

Two parallel herbaceous borders, a hundred yards long, separated by a grass walk and enclosed by Yew hedges, contain a collection of species and varieties of garden plants most suitable for the purpose. They are supplemented by separate plantings of the more im-

portant kinds such as Irises, Lupins, Delphiniums and Chrysanthemums, which afford visitors better guidance in the selection of varieties than catalogues or flower shows can do.

So far, mention has been made only of the more or less permanent plantings of ornamental plants, but among the most important activities of Wisley are the comparative trials of fruits, vegetables and flowers, in which novelties are grown side by side with examples of older, well-tried kinds, so that their merits may be assessed by specialist committees and recommendations for awards made accordingly. These trials are extensive; for example, the National Fruit Trials, which for a quarter of a century have been conducted at Wisley in co-operation with the Ministry of Agriculture, contain over twelve hundred varieties of tree and bush fruits, growing either for trial or for comparison, on an area of 40 acres.

A range of glasshouses provides accommodation for Vines, Peaches, tender shrubs, herbaceous and alpine plants, and material required for experimental work, as well as for propagation of plants for the replenishment of the garden plantings and for the trials.

The Laboratory, built rather more than thirty years ago, is occupied by the administrative staff and advisory and research officers under the control of the Director. The greater part of the work is of an advisory nature. Very many Fellows of the Society avail themselves of this service, seeking information on the pests and diseases of garden plants and methods of control. Requests for identification of flowers and fruits and guidance in their culture and propagation are also numerous, as are questions relating to the characteristics of soils, fertilizers, weed killers and spraying materials.

Research work is carried out upon specially selected problems in pest and disease control and in cytology, and not a few of the investigations arise from problems submitted by Fellows and considered by the Staff to demand further study. Some of the research work is initiated at the request of various growers' associations who have encountered problems presenting difficulty to the horticultural indus-

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(Upper) View in Rhododendron Trials. (R. H. S. Gardens, Wisley.)

(Lower) The Laboratory. (R. H. S. Gardens, Wisley.)

—PHOTOS BY N. K. GOULD

# New Zealand Temperate Trees

A. L. POOLE\*

WHILE New Zealand has, botanically speaking, a remarkable and unique flora, this flora has yielded few horticultural treasures to the world's gardens. New Zealand is the most isolated land mass of its size in the world and this isolation reaches far back into geological time. The result is that our flowering plants are some 85% endemic, and amongst them peculiarities have developed, such as a large collection of tree daisies, tree violets, the largest buttercup in the world, one of the smallest conifers, forests of a sub-tropical structure growing in a temperate climate, and other wonders of botany. Yet with few exceptions no trees or shrubs have spectacular flowers. They are mostly small, inconspicuous, and as often as not whitish. All trees and shrubs are evergreen except some half dozen, so that there is no marked change in the appearance of the vegetation from season to season: the magnificent autumn colors of the northern hemisphere deciduous forests are not to be seen, and the freshening of the countryside when deciduous trees and shrubs begin to shoot in the spring is missing.

Nevertheless our flora of some 160 trees and shrubs contains many good horticultural subjects. Use of them has been made in our own country, more particularly of those from the element of our flora which has northern affinities. Trees such as *Vitex lucens* (Verbenaceae) and the Christmas tree, *Metrosideros tomentosa* (Myrtaceae), have been thoroughly domesticated in our horticulture.

With but a few days' knowledge of the Pacific Coast of the U. S. it is difficult to write in terms of those New Zealand trees which might be suitable for your climate. Some guidance can be gotten from a perusal of meteorological figures, and a study of these would indicate that our climate as a whole is not as severe as yours. The subjects mentioned, however, should succeed or should be

worthy of a trial. Many will be found mentioned in L. H. Bailey's Encyclopedia of Horticulture as having attained a recognized status in world horticulture. It is surprising how the fraternity of horticulture soon spreads its treasures over the surface of the earth.

Upon perusing a Pacific Coast of America flora one is immediately struck by the great dissimilarities to our own flora not only in species, but in genera and families as well. In the conifers there is a particularly marked contrast. We have no pines, firs, spruces or cypresses. But nearly all the American conifers have been introduced here and some of them, for example Douglas fir, western yellow pine and Monterey pine, form the basis of our exotic forestry. Most of our conifers are very slow growing. Some also possess distinctive juvenile forms and foliage. For these reasons they make good garden subjects. Our most common conifer, *Dacrydium cupressinum*, or rimu, belongs to an entirely southern hemisphere genus which is best developed in New Zealand. Although very slow growing it has a handsome juvenile form with long drooping branchlets. It grows in the forests from one end of the country to the other, so it should be hardy in the climate of Washington. Seed is difficult to obtain, as indeed is the seed of nearly all our conifers. Most are shy seeders with small seed which cannot be seen, and one is almost obliged to follow the tree fellers at the right season to obtain supplies. Most of the species are also dioecious. Once rimu trees are established they can be grown from cuttings using bottom heat.

A conifer which has North American affinities is *Libocedrus bidwillii*. It has a graceful juvenile leaf form and grows into a regular pyramidal shaped tree. As it grows in our mountains it is hardy.

Amongst our monocotyledonous plants we have a tufted tree belonging to the Agavaceae, *Cordyline australis*, or cabbage tree, as it is known, since early settlers used the young growth in the centres of the tufts as cabbages.

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\* Mr. A. L. Poole is a member of the Botany Division of the Department of Scientific and Industrial Research, Wellington, New Zealand.

Normally a swamp or wet ground tree, it has proved very adaptive in arboriculture, and is grown widely in many situations in New Zealand. It has been adopted overseas and is to be seen in many of the warm parts of the British Isles. If used discreetly its peculiar form adds variety to the tree and shrub planting. Periodically it has heavy flowering years when it produces an abundance of large panicles bearing small fragrant white flowers. The trees are greedy feeders and flower beds cannot be made near them.

The cabbage tree has several relatives in New Zealand, the most hardy and most striking of which is *Cordyline indivisa*. It is a very handsome plant seldom reaching a height of 25 feet, with massive heads of leaves, 4-6 inches broad. It is not as good a flowerer as *C. australis*, but when it does flower it afterwards produces a massive panicle of blue berries.

Amongst the dicotyledonous families the Pittosporaceae is confined to Australia, with

the exception of *Pittosporum* itself which has a wide distribution in the warm regions of the Old World. In New Zealand *Pittosporum* is well represented by some 23 species all of which are endemic. Some are small trees 25-30 feet high and one of them, *P. tenuifolium*, has been acclimatised in many temperate regions. The flowers are inconspicuous but the foliage is good. In the southwest of England it is grown as hedges and for cut foliage. Bunches are regularly supplied to Covent Garden. It is also good for coastal regions and is able to withstand salt spray. Another species, *P. crassifolium*, is also widely acclimatised but is suitable only for hedges. *P. eugenoides*, or lemonwood, is a small handsome tree of bushy and regular proportions, worthy of greater use in New Zealand as well as overseas. It is sometimes difficult to transplant, but provided plants are well balled there should be no trouble. Variegated forms are obtainable of this and of *P. tenuifolium* as well.



*Cordyline australis* or cabbage tree remaining after a swamp has been drained and replaced by pasture.



Amongst the medium sized trees the family *Malvaceae*, normally a tropical and sub-tropical family, has yielded successful subjects in New Zealand. One of the lowland trees, *Plagianthus betulinus*, or ribbon-wood, a name used because of the nature of the bark, reaches Stewart Island in the very south, so should readily survive in the climate of Washington. Another species, *Hoheria lyallii*, or lacebark, is a low tree of the sub-alpine forests of the South Island. At one time this tree was placed under *Gaya* which is a South American genus. Such relationships between the Chilean and New Zealand floras are numerous and remarkable. They have formed the subject of study by many plant geographers. *Hoheria lyallii* is one of the beautiful trees of the New Zealand flora, bearing in early summer a profusion of white flowers.

One of the most remarkable relationships of the southern hemisphere floras of South America, Australia and New Zealand is the presence of southern beeches in all these countries. New Zealand has five species, and hybrids between them. They constitute the largest remaining forest areas. They form very beautiful forests, with, in contrast to the broad-leaved forests, comparatively open undergrowth. The species can be readily used as horticultural subjects and can be grown from wildlings which occur in profusion in the forests, or from seed. Viable seed is produced in quantity only in seed years occurring periodically. For instance there has been a gap of ten years between the last two large seed years. The flowers are normally inconspicuous, but in these seed years the profusion of flowers can be so great that, for a brief period, trees are very beautiful. Two of the species, *Nothofagus menziesii*, the silver beech, and *N. cliffortioides*, the mountain beech, withstand as rigorous conditions as any New Zealand trees. Of these two *N. menziesii* is the best horticultural subject and forms good specimen trees. Of the other species *N. fusca*, the red beech, also withstands fairly rigorous conditions. It also makes good specimen trees. Little is said in Bailey about these beeches probably because of the difficulty in procuring

seed. In off seed years nuts are produced but these are sterile.

The New Zealand ratas or *Metrosideros* species, belonging to the Myrtaceae, are frequently used as horticultural subjects. Considering our proximity to Australia, the New Zealand Myrtaceae are not as well developed in genera and species as would be expected. No member of that huge and diverse genus *Eucalyptus* is indigenous to this country. The *Metrosideros* species are, however, fairly well represented. Although partly a tropical genus, it has reached its best development in New Zealand, where several climbers, an epiphyte which finally forms a giant tree (*M. robusta*), and trees are all present. The most beautiful member *M. tomentosa*, or Christmas tree, named because it bears bright red flowers at Christmas time, has become a widely planted tree. It is however a coastal tree which does not extend even to the south of our country, and will not withstand more than a few degrees of frost. The northern rata, *M. robusta*, and the southern rata, *M. umbellifera* (previously known as *M. lucida*) will withstand cold conditions. They grow somewhat slowly forming regular dome-shaped bushes and trees with dark foliage. Unfortunately they do not produce their beautiful red flowers until they are fairly old. Bailey notes that *Callistemon lanceolatus*, the Australian bottlebrush, is sold in the United States nursery trade for *M. robusta*. The two plants are quite different, one being a shrub and the other a tree.

Although not trees one could not leave the Myrtaceae without mentioning the tea-trees or *Leptospermum* species. We have two highly variable species which probably form the most common element in our vegetation. The natural forms are normally white flowered but a number of sports, possessing large flowers, pink flowers and red flowers have been obtained. When in full bloom they are very attractive shrubs. Recently, workers in California have been doing much hybridising of these tea-trees and have produced a wide range of excellent shrubs.

A number of other trees might be mentioned which for one reason or another, difficulty of

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# Unique Flora of the Great Smoky Mountains National Park

HARLAN P. KELSEY\*

UNDER a soft blue almost perpetual dreamy haze, varying in intensity from day to day and season to season, rests the great Southern Appalachian region, embracing the highest peaks and largest mountain masses east of the Rockies. Sixteen peaks rise more than 6,000 feet with Clingmans Dome the highest, 6,642 feet, and Le Conte 6,593 feet. "It is the great physiographic feature of the eastern half of the continent, and no such lofty mountains are covered with hardwood forests in all North America." They are the oldest mountains on the continent. Here descends the heaviest rainfall of the United States except that of the North Pacific Coast, often exceeding 100 inches in a year. And here is the main surviving remnant of the marvelous forest so relentlessly exploited and wasted in large part by man, that once covered the entire Atlantic seaboard and extended to the prairies of the middle West.

In the 500,000-acre park area there are three distinct life zones from base to summit of the high peaks—the Carolinian, the Alleghenian Transition, and the Canadian. This accounts for the amazing variety of plant life, held to be greater than in any other equal area in the temperate zone. Up to December 1948, 130 native tree species are recorded with about an equal number of woody shrubs and vines and some 1,400 herbaceous flowering plants. Botanists have to date listed over 1,700 species of fungi, 330 of mosses and liverworts, and 230 of lichens. To give a more complete ecological picture, the rich fauna should briefly be mentioned. More than 52 species of fur-bearing animals, some 200 of birds, 36 of reptiles, 37 of amphibians and 80 of fishes are known to occur here. There are still large unexplored areas within the boundaries of the park which have not yet been studied scientifically and which may be ex-

pected to add new species to both flora and fauna.

Extremely interesting ethnologically is the fact that the Great Smoky Mountains region was (and still is in part) the homeland of the largest and one of the most noteworthy aboriginal tribes in America, the Cherokee. They alone of the most northerly aborigines developed a definite system of writing in the form of Sequoya's syllabary. The cruel expulsion of the tribe westward by advancing "civilization" will forever remain a lasting disgrace to the white man. A hardy remnant, however, survived by "holing up" in the wild vastnesses and so-called "Hells" of the Great Smoky Mountains, and their descendents now occupy a thriving reservation at the eastern entrance to the park. The Giant Sequoia, *Sequoia gigantea*, and Sequoia National Park commemorate the name of the inexplicable halfbreed Cherokee who invented the remarkable syllabary. And what a priceless collection of soft-flowing euphonious names of mountains and streams the Cherokees bequeathed: Nantahala, Oconoluftee, Hiwassee, Tuckasegee, Yonahlossee and a hundred others.

The richness, luxuriance and beauty of the Southern Appalachian flora cannot be fully appreciated unless one spends an entire season observing the amazing succession of floral display from low cove to highest mountain peak. It was in 1871 that E. S. Rand in his book on "Rhododendrons and American Plants" said: "We do not appreciate the wealth of our American flora, and have shut our eyes to the richness which lies around us. In England a crowning glory of horticultural exhibitions is the show of 'American Plants' and we in America do not know what they are."

Over 50 years ago the noted botanist and editor, W. A. Stiles, wrote, "It is a fact that no part of the world has furnished the gardens of Europe and America with so many ornamental plants of this kind (shrubs and lawn trees) as this same Alleghany region. Along

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\* Mr. Harlan P. Kelsey is familiar to many readers as the joint editor of the most useful "Standardized Plant Names," as well as being a nurseryman of considerable repute and an energetic conservationist.

the course of every rocky stream are masses of the great *Rhododendron* and *Kalmia*, while on the borders are smaller broad-leaved under shrubs of rarest beauty. But, beyond question, the most beautiful flowering shrubs are the *Azaleas*, which are here massed together in the greatest profusion and luxuriance. There are a dozen other genera that could be named, each with a special charm of its own."

Today the picture has radically changed and at last Americans have come to a deep appreciation of their incomparable native flora, and American gardens are notably enriched thereby. No small influence in this great national awakening is the profound educational effect influenced by the National Parks on their millions of annual visitors. Throughout each season intensive nature programs of illustrated lectures and travel are carried out, staffed by expert naturalists who expound the entire wildlife features of each park in a broad and interesting way.

The Great Smoky Mountains National Park leads all others in number of visitors—far exceeding 1,000,000 annually—and explaining a half million highly diversified acres of wildlife is no light task, even with a much larger staff than now exists, an unfortunate condition that it is hoped will be corrected in the near future. This park has been singularly favored by having a chief scientist-naturalist of unusual ability and charming personality, Arthur Stupka. His personally conducted nature hikes and horseback rides over the hundred miles of scenic mountain trails and his motor caravans to notable points of interest are chief attractions of a park vacation to those who would have expert and sympathetic guidance in seeing and studying the exuberant flower displays, the rare birds and other wildlife at home in a superb setting of mountain and forest grandeur.

It is obvious that in the space of a single article it will be only possible to review a limited number of some of the most interesting and notable plants of the park. Notwithstanding destructive lumbering in parts of the area previous to its park status, there are most fortunately some 42,000 acres in an en-

tirely virgin state, where the biological rhythm has not been greatly disturbed, at least so far as plant life is concerned. In deep rich "coves" certain forest trees reach a size found nowhere else in America. The following circumferences at 4½ feet above ground have been recorded: Tulip tree, *Liriodendron tulipifera*, 17½ ft.; Cucumber tree Magnolia, *M. acuminata*, 18 ft. 3½ in.; Mountain Silverbell, *Halesia monticola*, 11 ft. 9 in.; Canada Hemlock, *Tsuga canadensis*, 19 ft. 9 in.; Red Maple, *Acer rubrum*, 15 ft.; Fraser Magnolia, *M. fraseri*, 7 ft. 9 in.; Yellow Buckeye, *Aesculus octandra*, 15 ft. 11 in.; Yellow Birch, *Betula lutea*, 14 ft. 1 in.; Sourwood, *Oxydendrum arboreum*, 6 ft. 4 in.; Fraser Balsam Fir, *Abies fraseri*, 6 ft. 7 in.; Alleghany Serviceberry, *Amelanchier laevis*, 5 ft. 10 in.; Mountain Winterberry, *Ilex montana*, 1 ft. 8 in., and Red Spruce, *Picea rubens*, 14 ft. 1 in.

Let us climb a typical trail—there are scores of similar ones in the park—from Gatlinburg, Tenn., (Park headquarters) to the summit of Mount Le Conte, entering the Canadian life zone at approximately 5,000 feet elevation, some 1,600 feet below the mountain peak. Canada hemlock and most hardwood trees have given way to forests of red spruce and Fraser balsam fir, sister to the balsam fir of our northern regions and Canada. There is a wonderful groundcover of deep, springy, damp moss. We have come through great tangles of Rosebay rhododendron or perhaps the brilliant Catawba rhododendron, or, according to season, contrasting masses of flowering dogwood and eastern redbud.

Under the spruce and Fraser balsam fir we find many plants equally at home in the North, including the dainty Yellow Beadlily, *Clintonia borealis*, and also its charming native cousin, the Speckled Beadlily, *C. umbellulata*, white with green mottling. The ubiquitous Woodsorrel, *Oxalis acetosella*, reminds one of the deep woods of Quebec or Northern Maine.

Hobblebush *Viburnum*, *V. alnifolium*, is common from Canada to the Southern Alleghanies, as is also the Scarlet Elder, *Sambucus pubens*, both species being found in the three



life zones in the park. Likewise, many species of trillium are native to the woodlands from Canada to North Georgia, but in the park are found several rare native species including the beautiful Rose Trillium, *T. stylosum*, Hegers (pronounced Huges) Trillium, *T. hugeri*, Catesby Trillium, *T. catesbaei*, Vasey Trillium, *T. vaseyi*, and others not found in the North.

Now from the long list of herbaceous perennials native to the park, space permits only passing notice of a few of the rarest and most notable. Of ferns *Trichomanes radicans*, *Asplenium bradleyi* and the Hartford fern, *Lygodium palmatum*; *Thermopsis carolinianum* with golden spikes; the showy Featherfleece *Stenanthium*, *S. robustum*, and along streams the attractive Brook Parnassia, *P. asarifolia*, with solitary white flowers veined with green, the great carpets of the charming evergreen Creeping Bluets, *Houstonia serpyllifolia*. The abundant Birdfoot Violet and its several variations are showy spring flowers.

Ladyslippers in several varieties are not uncommon and even include the Showy Lady-slipper, *Cypripedium reginae*, although rare in the park. On the highest rocky elevations are found a group of rare and interesting "alpines," including Alleghany Nailwort, sometimes called the "American Edelweiss," the Mountain Bluet, *Houstonia montana*; Mountain Dwarf Dandelion, *Krigia montana*; Alleghany Saxifrage, *S. leucanthemifolia*, and many others.

"Of special interest is the Galax, *G. aphylla*, glory groundcover of the Southern Appalachians. Its glossy evergreen, serrated, heart-shaped leaves carpet thousands upon thousands of acres underneath brilliant overhead canopies of purple Catawba and pink and white Rosebay rhododendrons, *Kalmia* and Flame azalea. On rocky exposed ridges, Galax turns a rich crimson under the autumn sun, reverting to green again in late spring."

A most conspicuous feature of the native flora in the park is the astounding size attained by rhododendrons and mountain laurel. A plant of the latter has been recorded with a circumference of 2 feet 6½ inches, while both *Rhododendron maximum* and *R. cataw-*

*biense* often reach a height of 35 to 40 feet, the result of ages of rich deposits of humus and a relatively humid climate. An extraordinary habit of the mountain laurel, *Kalmia latifolia*, is the frequent forming of "burls" at the base of the stem which often attain a weight of up to 400 pounds or more. These burls are more rarely produced by *Rhododendron maximum*. Hundreds of tons of these burls have been shipped out to be manufactured into pipes closely resembling the so-called "French Briar," and exhibiting a lovely "birdseye" grain.

In the park there are two curious parasitic shrubs, Piratebush, *Buckleya distichophylla*, living on the roots of hemlock, and Alleghany Oilnut, *Pyrularia pubera*, whose hosts are *Kalmia*, *Calycanthus*, and other shrubs. Along streams or in moist lowland woods grow luxuriant tangles of the evergreen Drooping Leucothoe, *L. catesbaei*; Mountain Stewartia, *S. ovata*, up to 18 feet in height, with charming white flowers 2 to 3 inches across, often called the American camellia; Brook Euonymus, *E. americanus*, locally called "Hearts-a-bustin-with-love" on account of the brilliant red heart-shaped seed which, in early autumn, bursts out of an orange-colored aril; and the Mountain Winterberry, *Ilex montana*, largest of all the deciduous hollies, often 15 feet or more high, and most brilliant of all when in full fruit.

Another strictly local shrub of great interest is the Hairy Whortleberry, *Vaccinium hirsutum*. Of low growth, the entire plant, including flowers and fruit, is "hairy," yet it makes delicious pies. The Cinnamon Clethra, *C. acuminata*, has conspicuous reddish bark, with solitary 8- to 10-inch racemes of white flowers. In the wild it often attains a height of 20 feet. Like all of the plants mentioned in this article, it is perfectly hardy in our Northern gardens. The well-known Mountain Pieris, *P. floribunda*, one of the most attractive evergreen ornamental shrubs, is another of the many fine contributions of the region to our gardens. Another is the Sourwood, *Oxydendrum arboreum*, with its conspicuous drooping pan-

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# Looking Forward With Rhododendrons

ENDRE OSTBO\*

FOR the time being it would probably be wiser to make use of what we now have on hand, than to look for new and different things. In the line of rhododendrons, the vast quantity of material now available has not nearly been used to its full possibilities, nor even known to most of the gardening folk.

For the woodland and shady borders, the present types of rhododendrons are very good, and with their variation from tiny creeping plants to large shrubs and small trees, give plenty of selection to carry out any design or fit any kind of landscape. The blooming time too, from February to August, is extremely important.

For city homes with suitable material for variation and shelter, rhododendrons give almost anything that can be desired. Especially the new low-growing *R. campylocarpum* hybrids have done more to make satisfactory and long-lasting arrangements around the small house, than most of the old fast-growing types used so much a few years ago.

But time changes again. The new low rambling houses with good views not only from the front steps and yard but right from the living room, where big windows sometimes extend to the floor, call for low-growing material and really fine plants decorative the year 'round. Materials for this kind of planting have to endure more sun and exposure than do most rhododendrons. The foliage is more important than ever, not only at close range, but from the house. The plants should not be too compact or rounded so that the leaves hide all the stems and branches. Irregular shaped branches and trunks give more strength and artistic feeling to the planting, and more character and interest in the individual plant.

There are a few new hybrids from *R. Kyawi* that have very deep rich green colored foliage we have not had before, and I

am sure there will be many more fine, late-blooming hybrids coming from this species.

*R. Kyawi* x *R. Ungernii* gives a very bold effect. The big leaves may need some shelter from wind and sun. *R. exburienne* (*Kyawi* x *didymum*) has rich green leaves of good shape and large size for a *didymum* cross. The flowers are clear, waxy red in August when few shrubs are blooming.

One fine little hybrid from *Fabia* x *Arthur Osborn* I like very much for foliage effect and habit of plant. The flowers are bright red.

There is a number of seedlings from a home-made cross, *Fabia* x *Souvenir of W. C. Slocock*, that is promising. It was made to get small, irregular-shaped plants for open woodland places. They take a good deal of sun. Some have grayish woolly foliage and some sprawl and hug the ground. Colors are yellow to copper and apricot.

The *R. repens* crosses will make some excellent small plants. The leaves are short and dark on those I have seen, but there are many more coming on of this type. They are new and also slow-growing, so it will be some time before we can make much use of them, but they have possibilities for producing many fine garden plants, like the *Griersonianum* hybrids have done so successfully in the last few years.

Now, again, *R. Griersonianum* is producing something new. It is the cross with our own western azalea. Several crosses have been made here in the nursery and are coming along fine. Some have buds this year. The foliage looks most like *occidentalis* though much larger and evergreen. One cross was made two years ago with *Griersonianum* x *auriculatum* x *occidentalis* which seems to be faster in growth with longer leaves. This should be late-flowering and very fragrant. There are late-blooming, fragrant parents on both sides. They show already that they will be variable, but some of them will be good, and it will be an interesting type for the cool, shady woodland plot or the big border.

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\* Mr. Endre Ostbo, certainly one of the leading authorities on rhododendrons in our area, is owner of the King of Shrubs Nursery, Bellevue, Washington, obviously titled with the magnificent rhododendron in mind.

# Some Arboreta and Botanic Gardens of the Eastern U. S. A.; Fall, 1948

B. O. MULLIGAN\*

AT THE END of September, 1948, I left Seattle on the Great Northern Railroad's "Empire Builder" en route to attend the 50th annual convention of the American Institute of Park Executives at Boston, Massachusetts, and the simultaneous meeting of the American Association of Botanic Gardens and Arboreta.

This line traverses northern Montana, passing through Glacier National Park, climbing to a high point over 5200 feet, and then covers many miles of flat prairie land, then bare of any crops. The difference in plant life between the western and eastern sides of the Cascade range is of course conspicuous, and to a resident of Seattle the scarcity of vegetation, especially of evergreen growth, is most marked.

At Chicago I stopped for two nights, chiefly to visit the *Morton Arboretum*†<sup>1</sup> on the western outskirts of the city, but also to see the botanical section of the well-known Natural History Museum (formerly known as the Field Museum). At the former, where I spent the best part of a day in the company of Mr. E. L. Kammerer, the arboriculturist, I was impressed by the amount of space available—the arboretum covers some 800 acres—providing both lengthy vistas as well as ample space for planting. There are fine specimens of native trees in large areas of woodland—oaks of several species, hickories, walnut, ash, lime, the hop hornbeam (*Ostrya*), black cherry (*Prunus serotina*), *Malus ioensis*, etc. Nature trails are arranged through these areas and illustrated trail guides published for the benefit of children and visitors. The climate is too severe to permit broad-leaved evergreens to thrive, but certain of the conifers do well, including the Colorado fir (*Abies concolor*), the Norway, Oriental, and Colorado

spruces, as well as *Picea Koyamai* from Japan; of pines, the white, Japanese red, the native red (*P. resinosa*), Scots, and limber pine (*P. flexilis*). Douglas fir is likewise very fair.

The trial rows of nearly 150 different kinds of clipped hedges are most interesting as well as educational; this is a feature which should be found in some botanic garden, arboretum or park in every distinct climatic area in the country, wherever space and facilities permit. Some outstanding plants for this purpose were *Euonymus alatus*, the wayfaring tree (*Viburnum Lantana*), *Ribes alpinum*, and certain species of shrubby honeysuckle (*Lonicera*). An account of these experimental hedges appeared in the *Morton Arboretum Bulletin* for September-October, 1946.

Other notable features are the collections of ground-cover plants (72), of old-fashioned roses (285), and the various plantings arranged systematically and geographically, as well as for beauty and effect at different seasons. Excellent permanent labels are to be found throughout.

This privately endowed arboretum was founded in 1921 by Mr. Joy Morton; there are two buildings, of which the Administration Building houses the offices, library and herbarium, and the Thornhill Building, completed in 1942 and including the original Morton library wing, holds a lecture room, laboratory, classrooms and an exhibition hall. The director is Mr. C. E. Godshalk. By its education program as well as the careful planning and development of the grounds this arboretum would appear to be doing an outstanding work for horticultural progress in the Chicago area.

Leaving Chicago on the afternoon of October 1, in Mr. Kammerer's company, we passed through the Indiana dune country and noted the conspicuously colored mahogany-red trees of the Tupelo (*Nyssa sylvatica*), as well as the Black oak (*Quercus velutina*) and

\* Mr. B. O. Mulligan, our Arboretum Director and co-editor of the Bulletin, gives us herewith an interesting account of visits to other Arboreta, on the occasion of a trip east to attend the 50th annual convention of the American Institute of Park Executives, Boston, Mass., in the fall of 1948.

†For notes see Page 43.



*Q. ellipsoidalis*, the American beech, paw-paw (*Asimina triloba*), and the rich red leaves of the shining sumach (*Rhus copallina*).

Next morning we reached Boston, after seeing the more brilliant fall colors through central New York state into Massachusetts. The afternoon was most happily occupied in visiting Mr. Will Curtis' delightfully natural Garden in the Woods at South Sudbury—a low-lying site well screened and shaded by native oaks, beech, hickory, birch and other trees—wherein has been assembled an exceptional collection of unusual plants, chiefly North American herbaceous species and low-growing shrubs, perhaps especially remarkable for the number of white-flowered and double varieties.

The first of our three visits to the world-famous *Arnold Arboretum* was made on Sunday afternoon, October 3, meeting Mr. Godshalk, director of the Morton Arboretum, at the Forest Hills entrance. Most of our time was spent in the groups of maples, notable for their variety as well as size and maturity, chestnuts, limes and hollies, though we also saw something of the birches and *Euonymus*. Very large specimens of the Katsura tree (*Cercidiphyllum japonicum*), some in fruit, of the Japanese cork tree (*Phellodendron lavalleyi*) and an early-coloring variety of red maple grow beside the road leading to the Administration Building, but in every section rare or beautiful trees and shrubs are to be found and it is only a question of individual choice as to where one goes.

The following morning, having added Mr. H. T. Skinner of Morris Arboretum, Philadelphia, and Mr. C. F. Wedell, of Long Island Agricultural and Technical Institute, to our party, and being led by Dr. Donald Wyman, horticulturist at the Arboretum, we again toured a considerable part and saw more outstanding or exceptional plants, but found time for a visit to the Administration Building, to see a part of the splendid library and to meet Dr. E. D. Merrill, formerly director and professor emeritus at Harvard.

During the afternoon all horticultural members of the convention were taken on a conducted tour of the Arboretum, and so we saw

it for a third time but with some different angles. On this occasion we were shown some of the new plants produced by the planning and technical skill of the present director, Dr. Karl Sax, and his associates—*Forsythia* "Arnold Giant," and "Arnold Dwarf," hybrid roses, a maple (*Acer rubrum* x *A. saccharinum*), poplars, pines, crab-apples, and others. These are being propagated in the Arboretum and distributed to a number of nurserymen throughout the country.<sup>2</sup>

On October 6 a brief visit was paid to the *Hunnewell Arboretum* at Wellesley, Massachusetts, about 13 miles from Boston, founded in 1854 by Mr. H. H. Hunnewell, and now owned by Mr. Walter Hunnewell. Here, in a private collection notable for fine conifers in a wide variety, are to be seen fully grown examples of such trees as *Magnolia Kobus* (about 50 feet high), the Golden larch (*Pseudolarix*), a weeping European beech, the Katsura tree, and many kinds of fir, spruce, pine, hemlock and other related genera. The assemblage of clipped evergreens on a bank overlooking the lake is also unusual and remarkable.

*New York Botanical Garden* was reached, in the company of Mr. Henry Teuscher of Montreal Botanic Garden, on October 8, but owing to heavy rain we confined our tour, under the genial guidance of the horticulturist, Mr. T. H. Everett, almost entirely to the glasshouses, which are large and extensive, and to the propagating houses.

The following day we went to *Brooklyn Botanic Garden*, meeting the director, Dr. George Avery, Jr., and having time to see most sections of this city-enclosed, 50-acre garden, as well as a glimpse of the large library. Some uncommon trees seem to thrive under these adverse conditions, including the paper-mulberry (*Broussonetia papyrifera*), several species of *Zelkova*—relatives of the elms—the Phoenix-tree (*Firmiana simplex*, or *Sterculia platanifolia*) some 20-25 feet tall, and a variety of oak species. The rock garden, rose garden, and herb garden are three attractive features, as are the tropical water-lilies in summer and early fall, grown in tanks outside the greenhouses. The latter contain a

good selection of ferns and succulents, as well as plants of economic value.

In Philadelphia on Sunday, October 10, I was taken by Mr. H. T. Skinner, curator of the Morris Arboretum, first to see the unique *Hemlock Arboretum* in Germantown, the work and property of Mr. C. F. Jenkins, unfortunately absent that day. Here is to be seen a garden of 7½ acres largely devoted to one genus of trees—*Tsuga*—and almost in fact to one species of that genus with its numerous variants, *Tsuga canadensis*, since several other Asiatic species are not hardy in this area. The result is a fascinating and varied gathering of tree forms, highly educational and of great interest to intending planters. The wonderful old specimens of *Franklinia* in full bloom must not be omitted from this brief account.

From there to *Morris Arboretum*, a property of 158 acres on the city outskirts belonging to and being developed and improved by the University of Pennsylvania.<sup>3</sup> In the older part of the garden are some superb specimen trees—the large-leaved North American *Magnolia macrophylla*, and beside it the Japanese *M. obovata* (*hypoleuca*), each not less than 40 feet in height; close to them a mature tree of the handsome Japanese birch, *Betula Maximowicziana*, and elsewhere splendid red, scarlet and other oaks, immense Tupelo trees 50-60 feet tall, a very large Chinese elm (*Ulmus parvifolia*), two exceptional Silverbell or Snowdrop—trees from the southeastern U. S. A., (*Halesia diptera* and *H. monticola*), as large as the magnolias. Throughout this Arboretum are to be found well-tended examples of rare or beautiful trees and shrubs, whilst other newcomers are growing in the nursery or greenhouses, including rhododendron hybrids raised by Mr. Skinner with the intention of widening the range which can be grown here. Of conifers there is an excellent variety grown, some now mature trees, others younger; a good example of the Lacebark pine of North China (*P. Bungeana*) grows beside the rose garden, one of the most pleasant parts of a very pleasing Arboretum. One of the greenhouses holds a remarkable planting of the rare filmy ferns.

A brief visit was made that evening to the 30-acre Arboretum at *Westtown School*, West Chester, Pa., where firs, pines, spruces and other conifers are especially featured, and some enormous examples of tulip, oak, elm, ash and other native and introduced trees are to be seen, but shortage of daylight prevented us examining them all in more detail. Mr. Albert L. Bailey, Jr., is responsible for and the enthusiastic custodian of this collection.

A very full day on October 11 was well organized for me by Mr. John C. Wister, director of the Arthur Hoyt Scott Horticultural Foundation at *Swarthmore College*, near Philadelphia. Here are grown very complete collections of peonies, both shrubby and herbaceous types; of daffodils, irises, day lilies, chrysanthemums and other plants; a representative assortment of trees and shrubs is also cultivated, the variety of Japanese cherries, lilacs, roses, rhododendrons and azaleas (in a charming woodland site) and some fine magnolias being especially notable, as well as the native oaks which are so outstanding in this area of the country in comparison with the Western states.<sup>4</sup>

In the afternoon we went to the *Tyler Arboretum* at Lima, Pa., founded in the first half of the 19th century by two Painter brothers; much of the planting was done between 1845 and 1853.

Some remarkable trees are still standing; a Willow oak, probably 100-120 feet; a tulip tree as large; the Oriental spruce, 70 feet; Osage orange (*Maclura pomifera*), 45-50 feet; *Magnolia virginiana*, 35 feet; *M. denudata*, the Yulan, slightly taller, the Lebanon cedar, and what is probably the largest Californian giant tree (*Sequoiadendron giganteum*) in the eastern U. S. A., approximately 40 feet tall. This arboretum is 640 acres in extent, but lack of funds prevents its proper development, although a lilac collection is to be planted, probably this year. Mr. John Wister is also directing this enterprise.

The last visit that day was to the *Barnes Arboretum* at Merion, a private estate where some 10-12 acres are fenced and enclose a very varied collection of trees and shrubs, the oldest specimens planted 40-50 years ago.

Some of those noted were the Japanese raisin tree (*Hovenia dulcis*), 45-50 feet, *Magnolia macrophylla* again, *Paulownia tomentosa*, which flourishes exceedingly around Philadelphia, the yellow birch (*Betula lutea*), and the China fir (*Cunninghamia*). Such evergreen shrubs as hollies, *Phillyrea*, *Pieris japonica*, *Osmanthus ilicifolius*, and the Fetter bush (*Lyonia lucida*), native from Virginia southwards, were thriving. In a woodland section is a well-labelled planting of ferns; there is a small rose garden, and collections of crab-apples and lilacs were also seen. A horticultural class for adults is conducted here by Mrs. Barnes, aided by other teachers from Philadelphia; this Arboretum is chiefly educational in purpose.

The next day I went on to Washington, D. C., and noticed how plentiful and common were the Sweet Gum trees (*Liquidambar*) in neglected fields close to the railroad—sometimes alone, sometimes sharing the ground with tulip trees or oaks, and often making brilliant splashes of color on the passing landscape.

At Washington, in the care of Mr. B. Y. Morrison, acting director, a morning was spent in driving through the *National Arboretum*, an area of 400 acres still in an early stage of development and not yet open to the public, but with sufficient planting already achieved to show the outline of the design. By far the most impressive work here is a hillside covered with hybrid Kurume azaleas of Mr. Morrison's own raising, many now 5-6 feet high, growing luxuriantly beneath high oaks and tulip trees.<sup>5</sup> Other plantings include pines, spruces, firs and hemlocks, hollies and magnolias, amongst the latter the very interesting hybrid *M. virginiana* x *M. grandiflora*, raised here by Mr. Oliver Freeman to the second generation; some maples, including *Acer Davidii* in healthy condition, a collection of crab-apples, and certain Leguminosae. The soil is generally light, acid to neutral, the site undulating, with both water and low hills, and spacious views. Amongst the native trees are willow and Black-Jack oaks, sweet gum, tulip trees, hickories, Tupelo (*Nyssa sylvatica*), beech, and Red maple; of shrubs, Moun-

tail laurel (*Kalmia latifolia*), *Rhododendron nudiflorum*, and at least three species of *Vaccinium*—the deerberry, Downy Swamp blueberry, and Dryland blueberry. Japanese honeysuckle is a major weed pest, as elsewhere in the eastern U. S. A.

In the excellent greenhouses I also noticed a number of unusual plants introduced by the U. S. Department of Agriculture, Bureau of Plant Introduction, and a larger assortment at the Plant Introduction Station at Glenn Dale, whither I went that afternoon. Some of these rarities we may hope will later find their way to Seattle for trial in this climate.

My last visits were to the *Missouri Botanic Garden*<sup>6</sup> at St. Louis, on October 15 and 17, and its large subsidiary arboretum at Gray Summit, some 35 miles west of the city on route 66, on the 16th.

At the former, where the director, Dr. George T. Moore, gave me many details both of the Garden and the much newer Arboretum, the most prominent display was that of the tropical water-lilies in large tanks between the entrance gates and the palm-house. Many of these plants are hybrids raised in the garden by the superintendent, Mr. George H. Pring. The giant-leaved *Victoria* water-lily in the circular central pool is another unusual attraction.

The series of greenhouses contain a most varied and comprehensive collection of plants—palms, ferns, succulents, desert plants, plants of economic value, etc.—forming an exceptionally valuable living educational exhibit.

In the grounds, of some 75 acres, are a number of smaller gardens—the Rose garden, Iris garden, Italian garden, economic plant garden and others, and a demonstration plot of various hedge plants. Some fine and remarkable trees are scattered throughout, amongst which were the Osage orange, with large green fruits, *Euonymus Bungeanus*, probably 25-30 feet in height, *Magnolia virginiana*, the European copper beech, and young examples of the wild China-tree, *Sapindus Drummondii*, native of the southern U. S. A.

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# Indian Azaleas

S. A. BRAINARD\*

The group of azaleas which we call Indian azaleas derives its name from one of its progenitors, *Rhododendron indicum*, a native of China and Japan.

Over a hundred years ago horticulturists of Belgium, and particularly of Ghent, hybridized *R. Simsii*, *R. ledifolium*, *R. indicum*, with the hope of producing a free flowering pot plant. They achieved what they had set out to do, but alas, they were not hardy and only succeeded under glass. They entered into trade and in due course were sold in Charleston and Savannah. The people of 100 years ago, being pretty much like ourselves, planted their pot plants out when the spring came. Most of them died, but a few of the more vigorous single varieties thrived and from them have come the great number of azaleas that make the southern gardens famous. This is what became of the vigorous single varieties. We northerners go to Mobile and Charleston to see them.

But the double varieties are not much grown outside, even in the South. They, together with newer hybrids of the same breeding, remain the beautiful plants we see in the florists' shops from Christmas to Mother's Day, with the peak of their season at Easter. Here in Seattle we often find them bearing paper labels to tell their names.

Each variety has a different character. The careful grower can look at the plant with no flowers and no tags and tell by its habit of growth, the shape of its leaves or what not, its name. Or at least he can say that it is Paul Shame, or it is Sport Erie, that it is Vervaeniana or one of its sports, Vervaeniana alba or Albert & Elizabeth. You see, as with most hybrids cultivated for a long time, sports are quite common and with azaleas often superior to the original plant. Most of the varieties with white margins on the petals have originated in this way.

The commercial grower always has in mind the improvement in the market that comes with a holiday. Certain varieties have been developed for particular holidays. At Christmas will you find in the market Paul Shame and its sport Erie, Eclairer, Vervaeniana, Mme. Petric, and its variants, and two not properly called Indian azaleas, i. e. Hexe and Coral Bells. Most of these early varieties will be poor plants with few flowers. Some branches will be in bloom while others will still be in bud. The best plants will be California grown, for on the coast of California, not too far from Eureka, a great many of these early blooming varieties are grown under glass and sent out in the fall to florists all over Western United States who finish and market them. Mme. Petric is a very weak grower and seldom grown on its own roots. Hexe is not a true Indian azalea. It was first noticed in Austria about 1860. Altho its parentage is in dispute it is commercially classified as a Kurume. It is vigorous, free flowering, a fine red, and grows very rapidly. Hence it can be sold cheap in proportion to its size. Indeed it was once grown as a stock on which to graft rare and delicate varieties of Indian azaleas. Best of all it is hardy here in Seattle, and planted where the flowers will not be exposed to full sun it grows more lovely each year. Coral Bells is a true Kurume with a small flower. It probably is the leading forcing azalea in the U. S. although rare in Europe. In the east it succeeds, but here in the northwest no one has been consistently able to grow it well and it is fast being discarded by commercial growers.

The next big flower holiday is Valentine's Day. All the varieties mentioned above with a few other kinds, Vander Cruysen, Triomphe, Miss Cottage Gardens, etc. appear. But this is the big day for Hexe, which now is more numerous than all the others together.

By Easter the true Indian azaleas are at their peak. Here we will find perhaps twenty kinds offered.

\* Mr. S. A. Brainard is a grower of fine azaleas at 6905 Seward Park Avenue, Seattle, Wash.

Then at Mother's Day there will be only a few, their place having been taken by Kurume azaleas and other plants. Snow-drift may still be seen, also a few *indicum* (*macrantha*) hybrids. These hybrids serve a double purpose for they are perfectly hardy in the Pacific Northwest.

Most of the plants except those early ones which came from California are grown locally. In fact Washington exports a good many more plants than it imports. This is how one commercial grower raises his plants.

Cuttings are taken in May from some of the new wood which starts from the lateral buds after the flowers drop. The lower leaves are stripped and the stems are inserted in three inch seed flats about one and one-half inches deep and one inch apart so each flat contains two hundred cuttings. The medium is half sand and half peat. Usually the cuttings are rooted with mild bottom heat in about thirty days. It is hardly necessary to mention that the cuttings are kept shaded and moist. The little plants remain in these boxes for eleven or twelve months and are fertilized and generally made happy for that time. Then the next April or May, after the frosts are over, they are planted out in beds in a good peaty soil, this time three inches apart. Given frequent doses of liquid manure and plenty of water, by fall they will be quite sizeable little plants with four or five branches. Now with the approach of frost all are lifted and packed quite tight together under glass for the winter. The nature of the roots, which are fibrous, makes this possible and very few roots are broken and little soil is lost. We now have come to the end of the second summer. The third summer they are bedded out again, this time six or eight inches apart each way. Some are planted in the four- or five-inch pots in which they are to bloom. Again they must have water and liquid manure, maybe iron and rare elements if they are indicated. But this third summer they must also be "pinched," i. e. the new wood shortened by rolling out the terminal bud. This is to give desirable shape to the plants. If it were continued too late we should pinch out the flower buds which would mean no flowers, so we

stop by July fifteenth. In September those plants that are large enough and showing buds are lifted and potted, or if grown in pots the pots are lifted and carried into the greenhouse to rest until December first in the case of the earliest varieties. At that time the heat is increased to 60 degrees and the plants are in bloom in four to eight weeks. The later varieties are brought in to heat later. Too early forcing will cause bud drop and uneven flowering.

Nearly all varieties succeed better when grafted, and in Europe nearly all are grafted. The lack of skilled labor here, its cost, and perhaps the fact that the buyers are not too discriminating, reduces the number of grafted plants to perhaps 25 per cent of the total number produced. The grafted plants may be recognized by their straight trunks.

To produce these grafted plants stocks of *Azalea Concinna*, a single purple *indica*, very vigorous and hardy, or *indica alba*, are started in May as cuttings. About August 15 these are lifted and potted in 2½-inch pots. Two weeks later they are grafted with firm wood scions using a cleft graft or a side graft, tied with thread and placed under double glass until united. The union will take place in 3 or 4 weeks in early September but by October it will take a little longer. From then on the grafted plants are handled like own root plants.

About 95 per cent of the plants sold here never bloom again. If you would keep your plant remember in the dry atmosphere of our houses it needs plenty of water. It will not be too wet if you set it in a shallow saucer filled with water. After the blooms have dropped and the weather is warm, about April 15 here in Seattle, repot your plant in a pot one size larger than it grew in. Use a good peaty compost. Then plunge the pot into a border where it will get sun at least one half of the day, or better, full sun if you are prepared to water it frequently. About June 1 shorten the new growth to make the plant branch and apply a little more liquid manure. Let it grow on outside until October 1 when you will bring it into a cool basement

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# Remarkable Garden Subjects

DONALD G. GRAHAM\*

VISITORS to the writer's garden have, over a period of years, expressed admiring comments on certain of the trees and plants. This consensus of favorable opinion may be of interest to many who are either starting a new garden or who would like to include in their garden, material that apparently strikes the popular fancy. All of the subjects mentioned are "remarkable" in the sense that they have been remarked upon by many visitors in a complimentary way. It is believed, however, that most of them will appeal to all garden lovers. They are all hardy in the Pacific Northwest and many of them are hardy in the Middle West and the East.

*Yoshino Cherry*. The improved pinker form known on the Pacific Coast as var. *Akebono* (Daybreak) is one of the most beautiful flowering trees. When in bloom it is a cloud of pink with not a leaf in sight. It grows up to twenty-five feet high, spreading in habit and is the earliest Japanese cherry to bloom in the spring. It is similar in type to those planted around the tidal basin in Washington, D. C., and to the Yoshino cherry so widely planted in Tokyo.

*Davidia involucrata*. This is one of Wilson's introductions from western China. It is a tree which, once established, will reach a height of forty feet or more and is of symmetrical habit. Its outstanding feature consists of large white bracts of unequal size which envelop the small insignificant flowers. The bracts from a distance resemble doves in flight (according to the imagination of some observers), hence the name "Dove Tree." It blooms freely in May.

*Styrax Obassia*. A slender tree up to fifteen feet in height. Its large leaves are attractive and the six to nine-inch racemes of drooping white flowers resembling orange blossoms are borne in June and are quite fragrant.

*Albizzia julibrissin rosea*. This is a tree up to thirty feet in height, of spreading habit, resembling an acacia in leaf. The chief feature of the flowers which come in midsummer is the numerous threadlike pink stamens one inch or more long which give the flower-head the appearance of a brush.

*Cornus florida rubra* never fails to excite comment with its masses of bright rose-red bracts (flowers) in May and June. Its autumn foliage and its leafless bluish branches in the winter are also attractive.

*Cercis Siliquastrum* is a slender deciduous tree growing up to twenty-five feet in height. Its pea-like flowers freely produced are bright purplish rose. In Italy this is the most delightful tree flowering in April and May. It flowers in a leafless state and the profusion of bloom gives at a distance the effect of a rosy purple mist. Its popular name of Judas tree is derived from the legend that this is the tree upon which Judas hanged himself after the Great Betrayal.

*Eucryphia glutinosa (pinnatifolia)*. This is not only the finest of all Eucryphias but of all late summer-flowering shrubs. It was introduced from Chile into England about 1860, but is quite rare in this country. It is a small deciduous tree growing up to fifteen feet in height and is quite erect in habit. Its flowers are borne freely in August and are about 2½ inches across with four pure white petals and a bunch of prominent dark, golden-anthered stamens. It should be given a location sheltered from strong winds.

*Wisteria venusta*. Grown in tree or standard form, this forms a striking garden subject especially if planted in pairs on opposite sides of a path or at the head of a flight of steps. It can also be grown in large urns for terrace decoration. It is equally attractive when grown and used as a climber. Its pure white blooms in drooping racemes about a foot long are borne freely in May and on a quiet day the whole garden is filled with their delightful fragrance.

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\* Mr. Donald G. Graham, one of the Northwest's outstanding amateur gardeners, needs little introduction to many of us who have visited his lovely garden in Broadmoor, Seattle. Mr. Graham's "way" in gardening is as remarkable as the subjects of which he writes.

*Euphorbia Wulfenii*. This first came to my attention from a comment made by Gertrude Jekyll in one of her books. A start was made by seeds imported from England. It forms an evergreen bush of spreading habit three to four feet high. It has long narrow bluish green leaves and striking round heads of chartreuse green flowers almost a foot in diameter. It blooms for several months in the spring and is exclaimed over particularly by women who visualize its flower arrangement possibilities. It should be planted in full sun in the foreground of a border. Its seeds are attractive to birds but self-sown seedlings increase once a start is made.

*Senecio Greyi*. A low-growing evergreen shrub deserving a place in the garden mainly for its beautiful silvery grey foliage. It thrives best in a sunny border and will reach a maximum height of three to four feet but it can be kept pruned to a lower height. In fact, hard pruning is advisable to prevent the plant becoming leggy or straggling. It can be used for the corner of a shrub border or the foreground of a bold herbaceous border as well as a ground work for lilies. Its flowers are small, bright yellow in color, borne in corymbs, in July or August. *S. Greyi* in most gardens (and probably in mine) is really *S. laxifolius*, a hardier, more vigorous and attractive plant than the genuine *S. Greyi*.

*Escallonia Iveyi*. This is a first class evergreen shrub growing up to ten feet in height. It originated as a natural hybrid in the garden of the late J. C. Williams at Caerhays Castle in Cornwall, England. It has shiny small dark green leaves, and from July on through late summer the large upright panicles of white flowers half an inch in diameter are freely produced.

*Meconopsis betonicifolia (Baileyi)*. This poppy with its satiny sky-blue flowers is extremely attractive. If the flower buds are pinched off the first year, the plant will form offsets and become perennial. Otherwise, being typically monocarpic, it will usually die after its first year of bloom.

*Fritillaria imperialis*, the so-called "Crown-Imperial." The pale yellow form of this plant,

var. *lutea*, with its large pendulous flowers curiously surmounted by a green crown of leaves is a stately border plant blooming in the spring. It is most effective when viewed from a lower elevation. This bulb should be planted a foot deep in the fall.

*Primula acaulis rubra*. This clear pink form of the common primrose is from the Caucasus. It is even more attractive in mass plantings than the more lush polyanthus.

Two *Hydrangeas* of spreading habit growing up to five or more feet in height are subjects of comment:

*H. villosa* has flat flowerheads of bluish mauve in the middle shading to pink mauve on the outside. It blooms in late summer.

*H. macrophylla (opuloides)* var. *Bluebird* also has flattish flowerheads which are sky-blue in color with darker blue sterile flowers in the center. It is much better than the common *hortensis* variety of blue hydrangea.

Three *Magnolias* have been frequently commented upon:

*Magnolia Veitchii* is one of the most beautiful of all deciduous magnolias. It is forty feet high in my garden and carries a profusion of large, light pink flowers in April, shortly before the leaves appear. *M. Campbellii* is one of its parents.

*Magnolia denudata* (formerly *Magnolia conspicua*) is always spectacular in the spring with its many, cup-shaped pure white flowers carried on leafless branches. It is most effective when viewed against the blue sky.

*Magnolia Watsonii* is a tall tree of irregular habit carrying in midsummer shallow, cup shaped creamy white blooms with prominent reddish stamens in the center. It is the most fragrant of all magnolias. The odor is like sliced fresh pineapple. It is a hybrid originating in Japan between *M. obovata (hypoleuca)*, from whence it gets its fragrance, and *M. Sieboldii (parviflora)*.

The most remarked upon of all *Camellias* is *Camellia japonica* Lady Clare (*grandiflora rosea*, Empress, Akasigata). The blooms are semi-double, deep pink, fully six inches across with golden stamens showing in the center be-

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# Waterside Plants

FRANCES KINNE ROBERSON\*

A list of the plants which may be grown beside a pool or stream may be quite long, but that portion of the list which may be selected for a particular planting is usually limited by the degree of moisture present, the space available, exposure, and effect desired.

Some of the same plants which help create an harmonious picture inside the border of the pool also fit into waterside plantings. Our first consideration will be for marginal plants which do not resent actually having their feet in the water. Rank growing members of this group include *Myosotis palustris*, the water forgetmenot, that profligate which spreads by seeds and rooting stems until it even covers the water. Almost as avaricious of space is *Lysimachia* or creeping jenny, with its rounded leaves and bright yellow flowers. But both of these plants serve the useful purpose of holding soil in place while also contributing a long season of bloom.

Another rampageous yellow-flowered plant is *Limnocharis flava*, or water poppy, whose running rootstocks send up new plants at frequent intervals so that one must eventually remove quantities of it. A similar plant of much less hardiness is *Limnanthes indicum*, or water snowflake, aptly named, as anyone will agree when they have once looked at the intricate fashioning of the little white blossoms. The eastern marshmarigold, with its gay yellow flowers, and the western one, with its white ones, are welcome additions to the pool border by reason of their shiny leaves as well as because of their handsome flowers.

*Mimulus moschatus* and other yellow flowered members of its genus will hold their own in competition with the foregoing plants.

Equally tenacious of life and slightly taller is the lovely pink flowered *Mimulus lewisi*. Other native plants harmonizing in texture with the monkeyflowers are *Tolmiea menziesi* or piggyback plant whose new young plants spring from the axils of the old leaves; *Tellima racemosa* or fringe cup with its tall spikes of greenish, lily-of-the-valley like flowers; *Mitella trifida* or bishopcap, and *Tiarella laciniata* or coolwort with their dainty flower sprays; and, of course, maiden-hair fern and deerfern.

Low in stature and often seen with deerfern is *Cornus canadensis* or dwarf cornel. This miniature dogwood requires careful handling and transplants best when a whole sheet of top soil, which usually consists mainly of rotting wood, is skinned from the ground with all the plants intact. There are apt to be: *Clintonia uniflora* with the limber strap-like leaves embracing the stem which supports one milk white flower; *Coptis asplenifolia* or goldthread; young plants of *Vaccinium parvifolium* or red huckleberry which may later crowd out its less stalwart neighbors; and moses of many sorts which fit themselves in between the other plants.

Suitable only for large areas and mass effects are the arrowheads, whether broad-leaved or the varieties whose leaves give these plants their common name. Other plants in the same category as to height and usefulness are pickerel rush with its contribution of blue flower, bog arum with the disagreeable odor which is emitted from this attractive calla lily, umbrella plant—although neither the large or small forms are completely hardy here, and perhaps even skunkcabbage deserves a place in this list. Pitcherplant, or *Darlingtonia californica*, certainly adds an exotic note, though not altogether harmonious, in my estimation.

Still taller and definitely more effective when used in large clumps are *Iris sibirica* in white or various shades of blue, *Iris versicolor* with blue flowers, *Iris missouriensis* in either

\* Mrs. Frances Kinne Roberson has been too long absent from the columns of the Bulletin ("Daphne Cneorum"—Spring 1945) and we are sure our readers will welcome her return heartily. Well known for her long and wide experience in the field of horticulture, Mrs. Roberson speaks with considerable authority on an unusual phase of plant life.

white or blue, *Iris pseudacorus* with yellow flowers, the Louisiana wild irises with their broad range of color including a tawny red, and the elite of this group, *Iris kaempferi*, commonly called Japanese Iris, with its huge flattened blossom, single or double, light to dark blue, lavender to deep violet, white, solid colors or with pencilled markings.

The tallest of the bayonet leaved bog plants, and perhaps the most widely associated with swamps, is the common cattail, *Typha latifolia*, but it should never be given a foothold unless its aggressive nature can be controlled by repeated removal of encroaching roots, or by a barrier, such as a concrete wall, to protect areas reserved for less voracious plants. Equally aggressive but more attractive is purple loosestrife which offers a colorful note among the tall plants.

Another wilding, suitable for large marginal areas, derives its common names of bogbean or buckbean from the red berries which follow the small bearded flowers. The leaf of the bogbean departs from the spiked types we have been discussing and holds its three leaflets in a more or less horizontal plane with a slight tendency to droopiness when fully open.

Background plants composed of native material might include: the aptly named goatsbeard, *Aruncus sylvester*, with its drooping spikes of white flowers soon turning brown; two representatives of the rose family, the pink flowered *Spiraea douglasii* which is often called steeplebush because of the spired form of the flower spike, and the foamy white flowered *Holodiscus discolor*, also known as oceanspray; and some form of snowberry, particularly one of those which bears extra large berries in great profusion.

An elderberry tree grows sufficiently tall to supply a high center of interest even though the weakness of the pithy wood makes it necessary to keep constant watch for breakage and to thin out old branches. Equally compatible with the waterside garden is the rounded outline of either *Sambucus glauca* with its black berries appearing blue-gray by reason of a gray bloom over them, or *Sambucus calliocarpa*, with its smaller scarlet berries.

Rank growing plants such as mint and bamboo, sedges and reeds, have purposely been omitted from the foregoing list but there remain many more wholly desirable plants which should be mentioned.

Several of the St. Johnsworts have an affinity for moisture. The tiniest one I know is a native, *Hypericum anagalloides*, which carpets wet banks with its light yellow-green leaves, in the axils of which appear the very small yellow blossoms, each of which holds a large quota of stamens. Yellow flowered also is the swamp buttercup but it is too rank growing to be introduced into the cultivated garden. It is far better to depend on globeflower for some yellow blossoms. These may be had in low or medium tall plants, such as *Trollius acaulis* and *Trollius europaeus*, respectively.

The insectivorous sundews also vary considerably in size. Oddity rather than beauty is their claim to garden interest. Two local varieties, *Drosera rotundifolia* and *Drosera anglica*, may be augmented by other American and foreign varieties. The fascinating action of the glandular hairs on the sundew leaves never fails to make one marvel at the ability of this plant to capture and digest its animal food.

Colorful companions for the sundews abound. The iris family offers the purple to white flowered *Sisyrinchium douglasii* and the yellow flowered *Sisyrinchium californicum*. *Dodecatheon jeffreyi* is a representative shootingstar, that saucy-flowered plant known by other common names such as mosquitobill, wild cyclamen and heronbill. Transient dwellers in a given spot are *Claytonia megarrhiza* or spring beauty, and *Montia parviflora* or miner's lettuce. They may show up in many unexpected places, but seldom reappear where sought. Perhaps this habit is commendable in that the element of surprise adds interest.

Not all waterside plants need be bog or marginal ones. Some of them should be chosen for their lush habit of growth which we associate with plants having a plentiful water supply during the growing season, even though there may occur a drier period coinciding with the rest period of these plants.

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# Additional Aquatic Plant Species of the Grand Coulee, Washington

THEO H. SCHEFFER\*

SINCE publishing a preliminary list of the aquatic plants of the Grand Coulee, in the summer issue, 1946, of THE ARBORETUM BULLETIN, much water has gone over the Big Dam, while we continued our research in the biology of the region. It seems desirable, therefore, at this time, to add to our memorabilia of the region such notes on the aquatic plants and their mothering waters as will be of interest when the picture will change by reason of power and irrigation developments. These observations and notes will supplement the findings of others who have undertaken to salvage historical values of the smaller faunal types, and of still others who are on the trails of Indian campsites and pictographs, or engaged in chiseling out the fossils.

The water picture of the Coulee has changed but little since our last report, but it has shaped toward changes that are now more apparent than then. The big Equalizing Reservoir Basin—the whole of the Upper Coulee—is now restricted and restrained at the south by a dam of earth and concrete core, while at the north pumps are being installed that will flood its sagebrush flats and wheat fields, soak up its dunes, and obliterate for all time boundaries of former small lakes and swamps. In the Lower Coulee another new body of water will be created—Longlake Reservoir—tying together several remnant lakelets of the most southeasterly distributary from the former glacial cataract line. To build up this new reservoir a new Niagara will plunge from the brink of an old, to supply water carried through canals and a tunnel of 27-foot bore from the Equalizing Reservoir of the Upper Coulee.

These two enlarged bodies of water fresh from the Columbia will invite new forms of aquatic plants to their margins and former

types, particularly from the more alkaline springs and lakes, will be on the way out. Indeed, it may develop that, under the pressure of the upper reservoir, alkaline waters of the Lower Coulee will freshen up through seepage channels in the fault blocks of the basalt. Further studies in the existing waters and those yet to be impounded for irrigation in the Moses Lake region will wait opportunity. It will be understood that this lake is part of a channel of former outflow in distribution of water from the Cascades.

To the former list of sixty aquatic plants of the Grand Coulee may be added seventeen species collected or assembled in 1947 and 1948.

## Annotated List of Aquatic Plants (Cont'd)

61. White-stemmed Pondweed (*Potamogeton praelongus*). Collected only in the small lake well up in Northrup Canyon, a tributary of the Coulee.
62. Eel-grass Pondweed (*Potamogeton zosteriformis*). Collected only in the Northrup Canyon lake.
63. Hornwort (*Ceratophyllum demersum*). Collected only in the fresher waters of the Northrup Canyon tributary.
64. Beaked Sedge (*Carex rostrata*). Collected in Northrup Canyon, scant elsewhere.
65. Single-bracted Spikerush (*Eleocharis uniglumis*). Collected by J. W. Thompson, in wet meadow below Dry Falls.
66. Stream Orchis (*Epipactis gigantea*). Collected by J. W. Thompson on banks of run at Forbidden Springs, west wall of Blue Lake.
67. Willow Dock (*Rumex salicifolius*) (*R. mexicanus*). Fairly common on low moist ground.
68. Cursed Crowfoot (*Ranunculus sceleratus*). A common weed about ponds and swamps.
69. Chestnut Rush (*Juncus badius*). Collected along outlet of Dry Falls Lake.
70. Biennial Cinquefoil (*Potentilla biennis*). Common along streams.
71. Water Stalwort (*Callitriche palustris*). Observed only in the small stream outlet of Deep Lake.
72. Long-spurred Violet (*Viola adunca*). Common in a swampy meadow below Deep Lake.
73. Yellow Violet (*Viola glabella*). Collected along east side of the Upper Coulee.
74. Kidney-leaved Violet (*Viola nephrophylla*). Collected at spring run on Osborne ranch.
75. Sea Milkwort (*Glaux maritima*). Collected along waters in the Dry Falls State Park, Cascades Canyon.

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\* Supplementing a former article (Summer 1946 —“Aquatic Plants of the Grand Coulee”), Mr. Theo. H. Scheffer, collaborator, United States Department of Agriculture, supplies us with additional data for the records.

# The Arboretum Bulletin

VOL. XII, No. 1 SEATTLE, WASH. SPRING, 1949

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## Special Notice

To keep memberships in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears and previously established \$2 memberships more than thirty days in arrears will be dropped and THE BULLETIN will be discontinued.

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## Notes and Comments

Dr. Franz Verdoorn, internationally known botanist, has recently been elected director of the newly created Los Angeles State and County Arboretum.

The new arboretum, located at Arcadia, California, adjacent to the famous Santa Anita Race Track, comprises 111 acres of what formerly was known as the "Lucky Baldwin" Ranch.

Historic buildings on the property, built as early as 1839, will be rehabilitated and restored to their original conditions, two of which stand on the shores of a two-acre artesian lake surrounded by eighty-year-old eucalypti, palms and other trees. The site has unusual possibilities.

1 1 1

The Victoria Spring Garden Festival, sponsored by The Victoria Horticultural Society, will be held May 4 to May 7.

Through the courtesy of the owners, conducted tours have been arranged for each morning and afternoon of the festival, covering in all 30 to 40 outstanding gardens which contribute to the famed beauty of Victoria, the Floral City of British Columbia.

For further particulars a souvenir program is available by writing to the Society, 255 Battenford Avenue, Victoria, B. C.

1 1 1

Seattle's "City of Flowers Spring Festival" will be held the week of May 1 to 7. The Festival, a week of activities dedicated to publicizing Washington State flowers, is to open with a parade on May 1.

Members of the executive committee directing the activities are: Ralph G. Grossman, general chairman; Ray Guisti, president of the Allied Florists of Seattle; John Van Dyke, president of the Washington State Nurserymen's Association; Mrs. John S. Briggs, director of the Snoqualmie District of the Washington State Federation of Garden Clubs, and Howard W. Parrish, Joshua Green, Dr. John Hanley and Cecil Solly.

One outstanding highlight of the program for the week will be the Flower Show, May 1,

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## Book Reviews

*Ornamental Cherries*, 1948, by Collingwood Ingram. Published by Country Life Limited, London; Charles Scribner's Sons, New York. Price \$6.00

**C**OLLINGWOOD Ingram is a well known British garden authority. His numerous articles have appeared in the "Gardener's Chronicle" and the Journal of the Royal Horticultural Society. His knowledge of the flowering ornamental cherry has not been surpassed. It is backed by years of study in the garden and through world travel.

"Ornamental Cherries" is a book equally satisfying to the average gardener as well as the exacting botanist.

It is divided into three main parts:

Part I is of general nature, covering the ornamental use of cherries, propagation, seeds and hybridization, planting, how to grow cherries as dwarf trees, diseases and pests, history and folklore, and finally literature and nomenclature.

Part II covers the wild species and their varieties which are noted for their ornamental beauty. Since the book is intended for both popular and scientific discussion of ornamental cherries, Part II has been treated very effectively by placing the botanical discussion in the form of a note at the end of each description. Thus the gardener is not forced to assimilate botanical literature of minor importance to his general requirement.

Part III deals with horticultural varieties of Japanese Cherries, giving very complete descriptions of the most popular and lesser known varieties.

Mr. Ingram's observations are based on twenty-five years of collecting and growing these cherries. He does not claim to cover all species and varieties but those listed in Parts II and III are ones he is personally familiar with.

Enhancing the book are many fine plates of species and varieties as well as a number of colored plates made from water colors by Mr. Ingram.

—ROBERT J. HANSEN

1 1 1

*The Rhododendron Yearbook for 1948*, Edited for the American Rhododendron Society by Robert Moulton Gatke. Publishers: Binford & Mort, Portland, Oregon.

**T**HE Rhododendron Yearbook for 1948 is more national in its scope than the three previously published; nearly half of the articles coming from Eastern rhododendron enthusiasts and specialists, dealing with eastern conditions and problems.

The index of authors includes a galaxy of stars rarely brought together in one small volume. Mr. Clement Gray Bowers, author of the most outstanding work on rhododendrons, discusses the complicated and difficult problem of cultivated rhododendron nomenclature, affecting the new hybrids and polyhybrids. He says, "Obviously, the rules need to be extended . . . some kind of landmarks need to be established in order to control the chaotic condition that might occur, if the many untrue-to-type seedlings, masquerading as authentic species and varieties should get out of hand. With seedling material of species that may be hybrid to start with,

plus uncontrolled crosses, plus the natural tendency of rhododendrons to vary, we face a problem of keeping things straight."

He advocates "keeping the whole ancestral record for reference in an international study-book, without burdening the common literature of the subject with the increasingly complex genealogy. Such a book could be kept by a joint commission of the three rhododendron associations, British, American and German.

Mr. Joseph B. Gable, the well-known Pennsylvania nurseryman, has contributed an article describing his experiences of growing rhododendrons during the past twenty-five years; rhododendrons that have proved themselves able to withstand the severe cold of the Eastern winter, as well as the intense heat and dry atmosphere of summer.

It is interesting to note he has been able to use certain members of the Fortunei series successfully. He states that *R. discolor* is the only four-star broadleaved rhododendron capable of being grown in the Eastern United States; this he has crossed with many other species and produced plants of great merit.

Mr. Gable has recorded his failures as well as his successes and his article should act as a spur and a guide to further efforts in the fascinating endeavor of developing finer rhododendrons that will flourish in the eastern climate.

It is a matter of congratulation to secure an article of such importance in a field where so little work has been done, by so reliable and conscientious an experimenter.

Mr. G. G. Nearing, of New Jersey, in a valuable article describes his efforts along the same line, and develops the thought, among other interesting ideas, that only the hardiest seedlings, from plants that have been able to withstand the climate without too much coddling, should be used.

Another experimenter, trying to develop hardier rhododendrons, is a young man by the name of Donald L. Hardgrove of Long Island. Several varieties are listed from a group of three hundred *R. decorum* seedlings, after a nine year test in sub-zero weather with no protection. Much may be expected from an enthusiastic grower who says "The day may not be far off when rhododendron fanciers will be growing hardy hybrids, rivaling Tally Ho, Fabia, Loderi, Azor and Lady Chamberlain."

Mr. W. R. Coe of New York City sends in a list of varieties growing on his Oyster Bay estate. Fifteen to eighteen thousand plants in the collection, some of which "have been in the ground for twenty-five to thirty years" with the thermometer each year dropping several points below zero. The list is divided into two parts, those mentioned above, and a second section that includes more tender varieties planted in a more protected location.

From the Pacific Coast area, Mr. Lester E. Brandt of Puyallup, Washington, has an excellent article entitled "Lepidote Rhododendrons" which intrigues the amateur with a desire to see and know more of the many he mentions. It is an immense group of many series and includes numerous well-known and beautiful rhododendrons as well as a great number the amateur will welcome. Many rare ones have

bloomed for him and he looks forward to see many more.

Mr. John Bacher, a director of the Society, has two articles; one on "Soils for Rhododendrons" which is a thoroughly practical article that should be read by every rhododendron grower. Also an article on the "Strawberry or Black Weevil," which seems to be about the only pest we have in the Northwest and that to a very limited extent.

Mr. Brian O. Mulligan's informative and delightful paper given before The American Rhododendron Society, July last, deals with "Plants to Associate with Rhododendrons," and is reproduced in full "as it contains so much material for reference, that should be available to members through the pages of the Yearbook." To one establishing a new garden or remaking an old one, for amateurs and professionals alike, this article is invaluable. It concludes with a list of small trees, fifteen to thirty-five feet high and shrubs eight to fifteen feet, that may be used with such plantings.

An article "Azaleas at the University of California Botanical Garden" is reprinted with permission, from "Journal of the California Horticultural Society."

"Rhododendrons for Forcing," by Mr. Herman J. Grootendorst, will be of special interest to florists and to amateurs having greenhouses. The trials covered a period of two years and were held in the greenhouses of the Boskoop Trial Gardens, Holland. Out of one hundred and twenty-five rhododendrons tested only forty-five were classed as forcers.

The Yearbook ends with a "List of Hybrid Azaleas" reprinted with permission of The Royal Horticultural Society from the 1947 Rhododendron Handbook, followed by a roster of officers and a list of members.

The Yearbook contains a mine of information on all phases of Rhododendron culture and is worthy of a place in the library of every rhododendron grower.

—M. R. T.

✓ ✓ ✓

*The New World Cypresses*, by Carl B. Wolf and Willis W. Wagener, "El Aliso," Vol. I, (April 1948). Rancho Santa Ana Botanic Garden, Anaheim, California. Price \$3.55, including postage.

THIS paper-covered, 444 page monograph represents the result of twenty years work by Drs. Wolf and Wagener since the founding of this Californian Botanic Garden in 1927, and is the first volume of a new botanical and horti-

cultural publication. The name "Aliso" is that used by Spanish Californians for the native Western Sycamore, *Platanus racemosa*.

The work comprises three sections. Part I, taxonomic and distributional studies; part II, diseases; part III, horticultural studies and experiments.

Fifteen species and one sub-species are recognized; ten of these occur in California, four with certainty in Mexico (including one on Guadalupe Island off Baja California), one in Guatemala and Costa Rica, (*C. lusitanica*), and the single sub-species (*C. Bakeri* sub-sp. *Matthewsii*) in both southern Oregon and northern California. *C. guadelupensis*, *C. montana*, and *C. Stephensonii* have each only one known habitat area; several others are limited to two or three stations in the U. S. A., so that there are excellent grounds for Dr. Wolf's plea for the establishment of Cypress reserves to maintain these remaining wild trees. No certain natural hybrids are known, and very few species occur in the same localities.

The book is a mine of information on its subject. Included in part I (250 pages) are accounts of the taxonomic treatments by earlier authors, the geography and morphology of the genus, a detailed key based primarily on the foliage, secondarily on the bark of the mature trees, followed by a thorough account of each species; then lists of excluded and recognized species, the latter with principal synonyms.

Of the thirty-seven photographs illustrating this part, the great majority taken by the author, twenty show either mature trees or the base of the trunk; seeds and mature cones of all fifteen species, and foliage and young cones of eleven of the species, the latter not always too clearly reproduced, though the fruits are generally very adequate. A double-page distribution map would have been a welcome addition.

In part II (67 pages), by Dr. Wagener of the U. S. Department of Agriculture, by far the most serious disease attacking cypress trees is the *Coryneum* canker, which eventually girdles and kills affected branches or even the tree above the infection site. *Cupressus macrocarpa* is so severely affected that three-quarters of those planted in California have been lost from this cause, and a considerable number of Italian and other susceptible Cypresses. Test plots at Stanford University showed that the species could be arranged in five groups according to susceptibility, led by *C. macrocarpa*, followed by *C. Goveniana*, *C. Abramsiana*, *C. pygmaea*, and *C. lusitanica*. Amongst resistant species were

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*C. arizonica*, *C. Bakeri*, and *C. glabra*. *Thuja plicata*, *Juniperus virginiana* and *J. chinensis* are slightly susceptible. Control by cutting out affected areas has not proved successful; all infected trees should be removed entirely. Spraying with Bordeaux mixture (4-2-50) to kill spores is recommended.

Other minor diseases are also mentioned, and many photographs illustrate this section.

Part III is chiefly the product of experience gained at the Botanic Garden in growing, observing, and utilizing Cyresses, and as such contains much practical information for Californian gardeners and nurserymen. Growers elsewhere will have to experiment for themselves, but undoubtedly a number of species can be grown along the Pacific coast at least as far north as southern British Columbia.

Seed collection and storage, propagation, handling in pots and flats, soil types, planting, spacing, and forming hedges, are some of the subjects covered.

It only remains to say that there is an excellent index, that proof-reading has been admirable and printer's errors are remarkably few, and that this is an indispensable study to any garden or arboretum which grows or can grow any of the true Cyresses.

—B. O. M.

1 1 1

*Shrubs for the Milder Counties*, by W. Arnold-Forster. Published by Charles Scribner's Sons, 597 Fifth Avenue, New York, 1948. Price \$6.00

THIS 350-page book is certainly one of the utmost value to all garden lovers and nurserymen on the west coast from Vancouver, B. C., to Southern California, because it gives information on a great wealth of trees and shrubs,—many of them rare and little-known but highly desirable,—which can be grown in various sections of this climatically favored strip of land. The fact that the information is for the most part derived from personal observation and experience, after twenty-eight years of English gardening in an extremely wind-swept situation, makes it all the more reliable and acceptable. Data on many important genera, or on behavior of plants in certain districts, has been patiently gathered from numerous skilled and informed sources duly acknowledged in the preface, the majority in Cornwall, S. W. England. An appreciative foreword is contributed by Lord Aberconway, President of the Royal Horticultural Society, London.

Chapters II, III, and IV respectively supply, after pertinent introductory remarks and suggestions, comprehensive descriptive lists of species suitable for providing shelter from wind, for planting along roads and in towns, and finally a general list of the best plants for milder climates. Chapter III can be especially commended to Parks authorities for its most practical advice on selection, planting, staking and care of trees. Various signs indicate specially recommended choices, those most able to withstand wind, those needing shelter, others which are definitely tender, and so on.

Then follow separate chapters on eight important groups of trees or shrubs; *Acacia*, *Camellia*, *Ceanothus*, *Eucalyptus*, *Magnolia*, (written by Mr. G. H. Johnstone, one of the leading English authorities on the genus), *Metrosideros*, *Nothofagus*, and *Olearia*. It is interesting to note the emphasis here on natives of

the southern hemisphere,—five out of the eight names,—but unfortunately many of the species of *Acacia*, *Eucalyptus*, and *Metrosideros* are beyond our attainment in the northwest. Amongst the remainder however are numerous others well worthy of trial, not only in our Arboretum but in many instances in gardens also, though some grow too large for the general planting and careful discrimination will be necessary. Camellias, especially the species and new hybrids, Magnolias, with emphasis on the Asiatic kinds, and Ceanothus all include first-class plants for the Puget Sound region, and are well covered in these chapters.

Chapter XIII deals with *Prunus*, *Pyrus* (including *Malus*, the crab-apples), and *Sorbus*. Few of these necessarily require a mild climate and the author does not go into great detail, for the most part only mentioning the best of these large groups, although omitting the lovely *Prunus campanulata* and its relative *Prunus cerasoides*, Kingdon Ward's Carmine Cherry, and some *Sorbus* of merit, such as *S. cuspidata* and *S. Folgneri*.

The next thirty-two pages are devoted to Rhododendrons and Azaleas, giving an admirable selection both of hybrids and species, conveniently divided by height and color, so that plants can be selected for any sized garden, often with additional information as to hardiness or otherwise. One section of this chapter, on scented species and hybrids, chiefly of the rather tender *Maddeni* series, will be a spur to enthusiasts who may have tried some of these lovely shrubs outdoors, and can now see from the photographs how they grow in Cornwall.

Finally, a slightly longer chapter on "Some Uncommon, Untried, or Tender Shrubs," which fascinating as it is to read, contains but few plants which can be expected to grow successfully outdoors north of the Bay Region in California. Some nevertheless are worth a trial in sheltered corners and will be tried in Seattle,—indeed some are already being grown here,—but it is our friends in San Francisco and southwards who will benefit by this chapter.

No one can write or produce a book of this kind without providing room for some criticism on the scores of errors or omissions, and whilst these exist they are for the most part relatively few and minor.

The most aggravating inconsistency, particularly as it occurs scattered through the book, is the small initial letter given to some italicized generic names, as on pages 5 and 116. This should be corrected in any later edition.

No distinction is made between the much confused *Senecio Greyi* and *S. laxifolius* on p. 32; *Spiraea Veitchii* is included amongst *Sorbaria* species on p. 176; the plant described as *Malus hupensis* on p. 279 is probably not this species, which flowers early, but another so far unnamed. A few specific names need correction, as *Buddleja variabilis*, (p. 67), *Erica codonodes* (p. 70), *Jasminum primulinum* (p. 144), and *Osmanthus Aquifolium* (p. 159).

Some plants which might well have been included are *Acer oblongum* and *A. Campbellii*, *Rhus copallina*, *Senecio maritimus*, *Hebe (Veronica) macrantha*, *Viburnum odoratissimum*, *Rhododendron mucronatum* var. *Sekidera*, *Vaccinium padifolium*, and the Cornish-raised hybrid *Grevillea semperflorens*, besides others.

The interesting and varied Californian *Arctostaphylos* are dismissed in a few lines, and

deserve fuller treatment, as do the S. African species of *Protea*.

But the great merits of the book far outweigh these small defects. The author's forthright and easy style, often most vivid, as in his descriptions of *Senecio rotundifolius* (p. 31), *Myrtus Luma* (p. 156), the flowering of *Metrosideros robusta* (p. 251), and many other paragraphs; the personal knowledge of so many splendid trees and shrubs growing in their prime; the suggestions for suitable plant associations, as exemplified in *Clematis*, *Lavatera Olbia*, *Corylopsis*, etc; the assemblage of photographs to illustrate a small part of this plant wealth, some of them, especially amongst the Camellias, Magnolias, and Rhododendrons, of the highest quality,—though all regrettably lacking numeration;—and finally the book itself, where the large type, numerous subheadings, and full index make both reading and quick reference easy and simple. The author's hope that his work will produce more enjoyment of flowers elsewhere in the future is likely to be fulfilled here in the northwest, where interest in fine plants is continually increasing, and the climate, with occasional regrettable lapses, is kind to their prosperity.

—B. O. M.

1 1 1

## Unique Flora of the Great Smokies

(Continued from Page 13)

icles, highly valued for its late blooming and brilliant autumn foliage.

The magnolias of the park are also notable. Fraser and Cucumber tree magnolias have already been mentioned. A most conspicuous but rare species is the Bigleaf Magnolia, *M. macrophylla*, having the largest leaves of any deciduous tree in America, often over three feet long and a foot wide. Umbrella Magnolia, *M. tripetala*, has leaves second only in size to the Bigleaf. All magnolias have bright red seed cones in late summer.

But the crowning glory of the Great Smoky Mountains National Park floral display is the amazing and prodigal flowering genera of the ericaceous group, the azaleas, the rhododen-

drons and *Kalmia latifolia*. Starting at the lower elevations in late March or in April with brilliant pinks of *A. nudiflora* and *A. canescens*, and but little later the Flame Azalea, *A. calendulacea*, and *Kalmia latifolia*, the flowering slowly climbs through the different zones to the tops of the highest peaks. Here the exquisite Carolina rhododendron, in shades of deep pink to white, reigns supreme. In July or even early August, the rugged cliffs are ablaze with color.

*Kalmia*, Rosebay and Catawba rhododendrons alike grow at low elevations and climb upwards to the mountain tops with corresponding delay in time of blooming. There are a number of so-called "bald" mountains in the park, where arborescent growth gives way to grasses, sedges and shrubbery. The cause of this "baldness" has never been satisfactorily explained. One of the most notable examples is Gregory Bald. Here may be seen one of the most gorgeous floral displays in America when the Flame azalea, which is here in greatest abundance, is in full flower.

This has been an endeavor to supply an inquiring traveling public with a short factual picture of a few of the interesting and outstanding features, especially botanical, of a region that is unique ecologically and biologically, not only in America but in the entire world. And now may I briefly comment on some aspects of the conservation battle in our Southern Appalachians. The Great Smoky Mountains National Park (and likewise most of our National Parks and Forests) have only been saved by a narrow margin of time from devastating "private exploitation." Already visitors to this park unduly tax its facilities, and with completion of the famous Blue Ridge Parkway the situation will be more critical.

Should not the entire great Southern Appalachian Mountain region immediately be appraised and, before too late, have *adequate* areas of park and forest set aside, dedicated to the health, recreation and happiness of our rapidly growing population? There are wonderful areas of scenic and forest grandeur that are yet available. Will our complacent attitude persist and the awakening come too late?

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## *Winter In the Arboretum*

(Continued from Page 4)

three months include the following:

"Species Plantarum." C. Linnaeus, (3rd edition, 1764).

"Flora Japonica." Siebold and Zuccarini, (1835-1870; reprint of 1932).

"Forest Flora of New Zealand." T. Kirk (1889).

"Symbolae Sinicae." H. Handel-Mazzetti and others. (1929-37).

"Hardy Californians." Lester Rowntree, (1936).

"Yuccas of the Southwest U. S. A." Part 2. Susan D. McKelvey, (1947).

"Shrubs for the Milder Counties." W. Arnold Forster, (1948).

"Maintenance of Shade and Ornamental Trees." P. Pirone, (2nd edition, 1948).

Curtis' "Botanical Magazine," published quarterly by the Royal Horticultural Society in London, is now being taken by the Arboretum. A new series of this old and most famous of illustrated botanical journals was commenced in 1948.

## *Staff*

Owing in part, no doubt, to the wintry weather, illness amongst the staff has been much more prevalent than usual. In January the nursery foreman, L. Michaud, was absent for two weeks with bronchitis followed by pneumonia. In February the foreman, Earl Brown, was stricken with severe sinusitis which kept him in bed for a week; a similar trouble aggravated by pleurisy attacked the tractor driver, Homer Hartsell. Others have suffered at different times with colds and "flu" of varying intensity. In addition, my assistant, Robert Hansen, had a serious spinal operation in mid-December and is still convalescing at home, so that we have been considerably handicapped, particularly in late January and early February. Fortunately, however, the greater part of the clearance operations was completed before the worst of this visitation fell upon us, and we hope that all will be fit again in time for the preparation of ground and considerable spring planting program which lies ahead.

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## Some Arboreta and Botanic Gardens of the Eastern U. S. A.,: Fall, 1948

(Continued from Page 18)

This privately endowed garden is a fine example of the value of such an establishment to a large city, despite the serious handicaps of climate and surroundings.

Next day Mr. Pring drove me out to the Arboretum and left me in the good hands of the manager, Mr. A. P. Beilmann. The mechanical equipment, which I first saw, was such as to excite considerable envy in comparison with our own, but with an acreage some six times larger (1600) and a staff of the same size (ten men) it was clearly necessary. Some 600 acres of grass alone are mown twice annually with a sickle-bar mower. There is an attractive stone and timber office building with a covered area outside for picnicking visitors; a new laboratory has recently been built with living accommodations for visiting scientific workers when needed.

Planting was begun in the Pinetum about 1926 and many fine groups of pines, spruces, Douglas fir, Thuja, junipers and other smaller genera now exist in good health.<sup>7</sup> Some especially interesting or beautiful types were *Juniperus virginiana* var. *elegantissima*, *J. formosana*, apparently quite hardy despite its origin in China and Formosa, and *J. scopulorum* var. *horizontalis*. *J. virginiana* is the common native species round the Arboretum; other local trees include the Shingle oak and other species, hickories, ash, red maple, etc. Swamp cypress (*Taxodium distichum*) has been planted from twenty localities.

There is a collection of Asiatic crab-apples, since the native types succumb to rust fungus, and a walled garden partially planted with box varieties. In one section 500 acres are given up to the wild flora.

Roads through the Arboretum are not yet completed, but with a steady supply of gravel from the river bed (Meramec) and a very large new grader, some of the means for completing this important program are at hand. In the spring massed plantings of daffodils brighten many acres of land.

Also at the Arboretum is the Garden's main orchid collection, one of the largest in the country, some 30,000 plants in a range of glasshouses, from which flowers are sold regularly in the city and plants used for display at the Botanical Garden.

The future development of this vast undertaking will be watched with great interest by all concerned with similar establishments.

This is the briefest possible description of what proved to be a most exceptional three weeks in my experience of American horticultural institutions of all types and sizes. My gratitude and thanks to all, in many places, who made it so.

The Seattle Civic Garden Center has recently donated \$25.00 to the Arboretum for maintenance.

### ROBERT J. HANSEN

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## *Waterside Plants*

(Continued from Page 24)

One of the first names to come to mind in this category is *Primula rosea grandiflora*, followed by *P. cashmeriana*, *P. veitchii*, *P. sikimensis*, *P. japonica* and *P. florindae*. A waterside garden planted with these primroses will be gay with color from early spring to midsummer. Many others may be added to this list which is only representative.

Clumps of trilliums, violets and astilbes are welcome notes of interest where a good deal of green background of ferns or other foliage plants is present. Ladyslippers and other hardy orchids deserve a special portion of this garden devoted to their particular needs, with luxuriant greenery about them as a foil for the many intricately fashioned flowers.

A bold clump of daylilies often serves as a focal point for an otherwise meandering treatment of a sunny shoreline. *Lilium canadense* and *Lilium pardalinum* serve the same purpose in a woodland setting but require fewer plants to catch the eye.

The use of mass plantings is as important here as elsewhere but remains relative to the scale of the water garden and the area surrounding it. Naturalness is a highly desirable aim, as is a long season of bloom. Harmony of foliage texture and blending of flower colors both require careful attention. But simplicity should be the keynote of the plan and of the waterside garden which results. The overabundance of material from which to choose necessitates extra restraint if we are to create a garden of simple beauty as a companion to whatever body of water we possess.

## *Looking Forward With Rhododendrons*

(Continued from Page 14)

I do not recommend that the beginner make plans for these plants right away. There is sufficient material in the nurseries for any needs at the present time and very few gardens are big enough to handle all that is available in the trade. Gardeners, however, always have and always will look for new things, and it is to show what a vast quantity of fine things are coming our way in the near future that this article has been written.

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## Indian Azaleas

(Continued from Page 20)

window if you have one. By February 1 it will be ready to force again in a warm sunny window, and you will be well rewarded for your trouble. An alternate method, and one that will work quite well in most winters is to leave the plant outside in a sheltered spot until February 1 when it is brought directly to a warm window.

The Indian azalea is nearly as hardy as the camellia but like that plant the blooms suffer from inclement weather at the time they bloom. There are plants of the most tender kind that have survived the last ten winters here in Seattle; whether they will survive 1948-49 we shall soon know.

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## Remarkable Garden Subjects

(Continued from Page 22)

tween the heavy textured petals. It is perhaps the most spectacular camellia in the border because most of the large flowers are not hidden by the foliage. Rain does not impair the blossoms as it does so many camellias.

Among the Tree Paeonies the lustrous light pink Momoyama and the pure white Gesseki with flowers as large as dinner plates seem to excite the most comment.

Everyone admires *Rhododendron Loderi* var. *King George* with its large trusses up to eighteen inches across and individual florets up to seven inches in diameter. It opens a delicate pink turning white with age. A grouping of large plants is indeed a beautiful sight when in bloom in May.

Assuming that the tastes of garden visitors reflected in the garden subjects listed above might be considered as typical, a unique garden could be planned featuring these plants. If, on the other hand, the more likely possibility is that individual preference in flowers

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| *** Butterfly              | **** Loderi King George    |
| *** Cornubia               | *** Loder's White          |
| *** Dr. Stocker            | **** Mrs. G. W. Leak       |
| *** Fabia                  | *** Purple Splendor        |
| *** Faggeter's Favorite    | *** Souv. of W. C. Slocock |

3 and 4 stars are the English Quality Rating as given in the University of Washington Arboretum "Handbook of Rhododendrons."

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- |                     |                    |
|---------------------|--------------------|
| *†Chandleri elegans | * Arajishi         |
| †Goshogurma         | * Herme            |
| *†Kumasaka          | * Magnoliaflora    |
| *†Waukanora         | * Gouvernor Mouton |
| *†Col. Fiery        | †Reticulata        |

\*These varieties are among those recommended in "Camellias Illustrated" by the Oregon and National Camellia Societies.  
†Fine for corsages.

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is extremely variable, personal taste rather than popular appeal should perhaps govern. The infinite variety in gardens, both in arrangement and material, accounts for much of the interest we all have in seeing and enjoying other gardens.

1 1 1

*New Zealand Temperate Trees*  
(Continued from Page 10)

procuring seed, susceptibility to disease, etc., have not found extended use in horticulture. Some of these are worthy of trial. *Weinmannia racemosa*, a very common forest component belonging to a widespread Pacific genus, is perhaps one of the best of these. *Melicope ternata* belonging to the Rutaceae, *Alectryon excelsum* of the Sapindaceae, and *Nothopanax* and *Pseudopanax* of the Araliaceae are all worthy of trial.

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## Preliminary Notes on Frost Damage in the Arboretum

B. O. MULLIGAN

As stated elsewhere in this issue the winter in Seattle has been unusually prolonged and severe, with especially low temperatures in January.

It is much too soon yet (mid-February) to assess the full amount of damage done to plants by this cause, but the following are some preliminary indications.

All the young plants of *Acacia dealbata* set out in various positions last spring appear dead, and those of *A. longifolia* also. Several species of Californian shrubby *Lupinus*, including *L. albifrons*, are undoubtedly dead. In the *Cistus* collection some plants of *C. ladani-ferus*, *C. villosus*, *C. villosus prostratus*, and *C. salvifolius* are more or less severely burned by frost; *C. Palhinhaei* slightly so, as are the young Bay trees growing in the same area. Most of the related species of *Halimium*, except small plants of *H. ocymoides*, are unhurt, as is *Cistus purpureus*.

The shoot-tips of *Magnolia grandiflora* are somewhat scorched. In *Rhododendron* Glen no damage can be seen to *R. crassum*, *R. formosum*, or *R. fragrantissimum*, although in a low situation. On the contrary, *Hoheria glabrata* var. *Osbornei*, on the top of the south bank above the Glen, is considerably damaged. The camellias, as was expected, show no ill effects.

Amongst the *Ceanothus* on the bank east of Azalea Way those now most brown and scorched are *C. papillosus*, *C. thyrsiflorus* var. *repens*, and *C. Lobbianus*. Less damaged are *C. cuneatus*, *C. purpureus*, and the hybrid "Delight." Unhurt are *C. rigidus* and *C. impressus*. On the fence at the east side of the yard (facing west) *C. thyrsiflorus* is considerably browned in foliage, but not *C. Greggii* var. *vestitus*.

Damage is very obvious along the border on the south side of the glasshouses, where most of our more tender plants have been grown, and where sunshine falling on frozen foliage in the morning has undoubtedly contributed to these results. Apparently dead are *Adenocarpus foliolosus*, *Beschorneria yucoides*, *Calceolaria integrifolia* and *C. violacea*, *Campanula Vidalii*, *Diplacus* hybrids, *Lavandula dentata*, and the double-flowered form of *Leptospermum scoparium*.

Amongst those severely damaged with much-scorched foliage and shoots are *Correa magnifica*, *Ceanothus sorediatus*, *Hypericum balearicum*, *Lippia citriodora*, the Lemon-scented Verbena, the red-flowered *Leptospermum scoparium* var. *Nichollsii*, *Oxypetalum caeru-*

(Continued on Page 44)

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# ARBORETUM NOTEBOOK

*This department is published for correspondence and pertinent comments by experienced growers on interesting plants and their culture. We solicit your questions but space limitation necessitates the publishing of only such answers as we deem of general interest.*

GERARDE in his Herbal says—"I have thought to call it Barrenwort in English, not because that Dioscorides saith it is barren both of flours and seeds, because (as some authors affirme) being drunke it is an enemie to conception." By mentioning Dioscorides (50 A. D.) we realize how long this plant has been known. It is thought the name *Epimedium* was derived from epi—upon and Media, its native habitat. The family to which *Epimedium* belongs (*Berberidaceae*) is one of the most interesting of all plant families, containing not only the barberries but *Nandina*, *Mahonia*, and the exquisite little wilding, *Jeffersonia*.

*Epimediums* are some of our most valuable low evergreens. They are a group of woodland shrubs spreading by sending out shallow, tangled rhizomes, whose tips turn upward each year, making a leafy shoot. The foliage is formed of compound leaves varying in the formation of the leaflets. The leaflets are heart-shaped and do not develop their mature size until after the blossoming period. They, the leaflets, vary with different species and often the leaflets within a species vary. The blossoms, also, have no established routine in their florescence. They may be in a simple or compound raceme or a loose panicle, depending on the species to which they belong. The flowers of the different species vary in color, a greater range of color than in any other genus of the *Berberidaceae* family. They vary from white and yellow to violet, rose, and almost crimson. The blooms are much like the blooms of *Vancouveria* (described in the winter number of the Notebook) in shape and texture. There is one distinguishing mark; *Epimedium* has four and *Vancouveria* has six stamens. William Miller, writing in Bailey's Encyclopedia says, "The genus contains some of the daintiest and most interesting plants that can be grown in the hardy border. *E. macranthum*, particularly, is as distinct, complicated and fascinating as many of the rare, tender and costly orchids." According to Mr. William Thomas Stearn none are found native to North America. They are, however, found over a large range geographically, from the shores of the Mediterranean Sea through Europe, India, China, Japan and Eastern Russia.

*E. diphyllum*, native to Japan, is generally listed under *Aceranthus diphyllus*. The plant is small, quite dwarf, not conspicuous but very delicate, with thin, light green, almost hairless leaves, blunt at the tip. The flowers are campanulate and pendulous, four to nine on the stem. They are white, sometimes flushed with pink, and spurless, an important distinction. A hybrid called *E. Youngianum* is not particularly outstanding, but two more hybrids, *E. Y. roseum* and *E. Y. niveum*, are very fine.

*E. grandiflorum* from Japan is easily the most attractive of all species. It has flowers from one to one and one half inches, white tinged with pink. The leaves are deeply lobed, sharply toothed and covered with scattered, curled, red hairs. The lower stem usually has one trifoliate leaf. There are two varieties; *E. var. violaceum*

with flowers shading into a pinkish lavender. The young leaves are sometimes a distinct red.

*E. macranthum* found in Central China varies slightly from *E. grandiflorum*. The name for all garden purposes may be considered a synonym of *E. grandiflorum*.

*E. Musschiarum*, listed in Bailey's Encyclopedia is probably, according to Stearn, *E. macranthum* var. *Musschiarum*.

*E. alpinum*, the only member native to Europe, is considered by many to be least attractive of the family. It spreads rather rapidly. The young leaves are charming, have a red tinged margin. The flowers are small and not a clear yellow. This is a dwarf variety varying in size from two to three inches high. *E. alpinum* is not evergreen, dropping its leaves in November. There is a similar species, *E. pubigerum*, which is generally evergreen and superior to *E. alpinum* in many ways. *E. alpinum* is often seen in gardens.

*E. pinnatum* is found in N. Persia and along the Caspian sea. *Perralderianum* is so nearly like *E. pinnatum* it does not call for special description. In fact it is sometimes listed as *E. p. Perralderianum*. *E. p. Perralderianum* has leaves with fluted edges ("margin undulate") while *E. pinnatum* has plain edges. The flowers

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of both are yellow with a dull red center. They are both evergreen.

Epimediums grow easily in any woodsy, moist soil in part shade. Like many evergreens they color more brilliantly in winter if they have been grown in a drier, sunnier spot.

—G. T. D.

↑ ↑ ↑

*Magnolia grandiflora* likes the protection and warmth of a south wall and if kept pruned as a shrub will reward one with many blossoms. This means drastic pruning at blooming time. Cut every blossom or seed pod with a stem about eighteen inches long, also do any pruning necessary to avoid that straggly look which seems to be characteristic of this plant. Keeping the shrub low also allows one to enjoy the blossoms much more than when high up in the tree.

—"H"

↑ ↑ ↑

During this cold weather there was never a day when there was not something in the garden to cheer one. *Laurustinus* was beautiful even when bent over by snow. The red buds of the flowers against the dark green leaves never had a dejected look. Near by a tall bush of *Arbutus unedo* in full blow was quite as courageous. Back of these two bushes is a *Magnolia grandiflora* with its bright green leaves and in front of them a sprawling *Daphne odora*. All four stalwart against the weather. The clear, light green leaves of Bamboo along the driveway stand near a *Choisya*. Both of these were cheerful even on the coldest days and the red leaves of *Galax* were charming. All the little bronzy leaves of many dwarf Rhododendrons did not flinch nor did the small leaves of *Gaultheria hispida*. Our native Salal and Oregon grape grouped under the Madronas did not seem to know it was cold. The young bushes gave a variety of foliage and were equally intrepid. Those that gave me most pleasure, I think, were the many little bushes of *Daphne laureola*. During the worst storms they stood erect, defying the elements, never blanching.

—A. B. C.

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## A REFERENCE LIST OF HEATHERS

### *Calluna vulgaris*—

Else Frye, 1 ft., purple, June on.  
 pygmaea, 8 in., purple, June on.  
 minima, 3 in., purple, June on.  
 minima Smith's var., 6 in., lavender, June on.  
 County Wicklow, 10 in., double pink, Aug. on.  
 McKayi, 20 in., double pink, June on.  
 Mrs. H. E. Beale, 20 in., double pink, Aug. on.  
 alba, 15 in., white, June on.  
 nana, 4 in., lavender, June on.  
 Foxii nana, 4 in., pink, June on.  
 Alportii, 20 in., red-purple, August on.  
 Mrs. J. H. Hamilton, 8 in., double rose, Sept. on.  
 variegata, 15 in., pink foliage, July on.  
 Mrs. Pat., 8 in., light pink, May on.  
 Mrs. Gray, 2 to 3 in., deep lavender, July on.

### For Dry Situations

#### *Erica cinerea*—

15 in., reddish-purple, August on.  
 alba, 15 in., white, August on.  
 Domino, 9 in., white, August on.  
 rubra, 6 in., brilliant scarlet, July on.  
 G. Ford, 10 in., pink, June on.  
 Golden Drop, 6 in. Flower inconspicuous.  
 Lovely foliage, golden yellow in summer,  
 rich bronze in winter.  
 Apple Blossom, semi-prostrate, pale pink,  
 April on.  
 splendens, 12 in., glowing red, April on.  
 atro-sanguinea, 12 in., dark red, April on.  
 lilacina, 15 in., lavender, April on.  
 atro-purpurea, 12 in., deep pink, April on.

### For Moist Situations

#### *Erica ciliaris*—

10 in., scraggly gray foliage, rose, July on.  
 Mrs. Gill, 12 to 18 in., winey red, July on.  
 alba, 18 in., white, light-green foliage, June on.  
 Maweana, 18 in., deep red, coarse growth,  
 June on.

#### *Erica carnea*—

Springwood White, prostrate, white with  
 brown anthers, December on.  
 Springwood Pink, prostrate, January on.  
 King George, dwarf, deep pink, Nov. on.  
 Vivellii, prostrate, clear crimson, bronze fo-  
 liage, January on.  
 Ruby Glow, dwarf, crimson, metallic-bronze  
 foliage, January on.  
 Snow Queen, semi-prostrate, white, March on.  
 Gracilis, 6 in., pink, March on.  
 Winter Beauty, 6 in., deep pink, March on.

#### *Erica vagans*—

15 in., lilac, free flowering, August on.  
 St. Keverne, 12 in., rose-pink, floriferous,  
 September on.  
 Mrs. D. F. Maxwell, 15 in., bright cerise,  
 August on.  
 alba, 15 in., white, August on.

#### *Erica Tetralix*—

alba mollis, 6 to 9 in., white, silver-gray fo-  
 liage, June on.  
 Praegeri, 6 in., olive-green foliage, buds red  
 turning pink, June on.

#### *Erica mediterranea*—

Hybrid, 12 in., rosy-lavender, December on.  
 Brightness, 2 ft., rosy-lavender, January on.

#### *Erica arborea*—

alpina, 4 to 5 ft., white, April.  
 arborea, 12 to 15 ft., dull white, feathery fo-  
 liage, April.

#### *Erica australis*—

6 to 8 ft., large pink, very floriferous, Jan. on.  
 Mr. Robert, 6 to 8 ft., large white, January on.  
 Erica Dawn, 10 in., large, soft-pink, July on.  
 Erica Mackaii, 8 in., frosted-pink, July on.  
 Mackaii flore pleno, 10 in., double pink,  
 July on.  
 Erica Williamsii, 15 in., pink, July on.  
 Daboecia polifolia, 3 ft., lavender to purple,  
 March to December.

—MRS. W. W. SAWYER

1 1 1

Probably the most critical time of the year in the garden is the "growing season"—that first warm period in the spring when the leaf buds burst and the new shoots commence to grow at a surprisingly rapid rate. At this time it is very necessary to keep the moisture balanced with the warmth, so the new tender leaves will be kept on the move and not allowed to wilt. Also, at this time, do not fertilize to the point of forcing as that will weaken the vitality of the plants. After the plants have made a normal spring growth, water only enough to keep them in a healthy condition, allowing them to harden off gradually, so they will be able to withstand the rigors of winter. During this "growing season" the tender leaves are most tempting to the pests so spray continuously with a solution of one teaspoon of lysol to one gallon of water (or what have you that is not too strong) until the leaves harden.

—"H"

1 1 1

One of the uses to which the new plant hormone sprays have been put is to spray ornamental berrying shrubs which are shy in setting

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fruit. For example: A Magnolia Bluff gardener gave his lone Pernettya bush three sprayings of hormone solution while it was in full bloom. The result was masses of berries. I wonder how this would work on bitter sweet or on the strawberry tree?

BETH MALMO

*Neillia* is not startling in its beauty but its graceful habit of growth is distinctly ornamental to any shrub border. It resembles the *Spiraeas* in its foliage but the green of its leaves has a sprightliness seldom seen in the *Spiraeas*. The bush, at first glance, reminds one of *Stephanandra* with more spreading branches. All three of these shrubs belong to the *Rosaceae* family. The name is in honor of Patrick Neill, a Scottish horticulturist living in the nineteenth century.

There is more or less confusion among the several members of the genus. *N. opulifolia* is often listed as *Physocarpus opulifolius*, a North American species with white flowers tinged pink. *N. o. lutea*, with charming yellow leaves in spring, may be called in some catalogues *N. o. aurea*. *N. Torreyi* of the midwestern states may be found under *Physocarpus monogynus*. This has small, delicate foliage with white or light pink blossoms. There is a Chinese species called *N. tibetica*, a very attractive shrub with quite small foliage and tiny pink flowers. Also from China comes *N. sinensis*, a bush about six feet high with fairly conspicuous pink flowers that bloom in June.

The best of the species and the one most often seen is *N. longiracemosa*. This is a very graceful shrub, open with long arching branches covered with delicately lobed and notched leaves. In late May or June the blooms, a charming shade

of pink, come in dense racemes. Each flower is almost tubular in shape, campanulate and quite individual. The bush is an addition to any shrub border and rare enough to draw attention. Any good border soil suits the *Neillias*, which only need the long shoots cut back after blooming. They propagate easily from cuttings and will grow from seed.

#### A LIST OF PLANT NAMES (Continued from Fall Number)

Albrechtii	After Dr. M. Albrecht, Russian naval surgeon.
albocinctus	white girdled, crowned
albopictus	white painted
albopilosus	white, shaggy
albospicus	white spiked
albus	white
Alchemilla	Arabic name. Herbaceous perennials.
alchemilloides	Alchemilla-like
alcicornis	elkhorned
Alectryon	Gr. name for chanticleer. Tall trees.
aleppicus	of Aleppo, Syria
Aletris	Gr. name of female slave. Small herbs.
Aleurites	Gr. floury. Tropical trees.
alexandrinus	of Alexandria
algidus	cold
alienus	foreign
Alisma	Derivation doubtful. Hardy aquatics.
Allamanda	After Dr. Allamand. Tropical shrubs.
alliaceus	of the Alliums, garlic-like
Allium	Ancient Latin name of garlic. Bulbous plants.
Allophyton	Alternate leaved.
alnifolius	alder leaved
Alnus	Ancient Latin name. Alder.
Alocasia	Name made from Colocasia. Greenhouse foliage plants.
Aloe	Arabic name. Perennial succulents.
aloides	Aloe-like
aloifolius	Aloe leaved
alpestris	nearly alpine
alpicola	dweller in the Alps
alpigenus	alpine
Alpinia	After Prosper Alpinus, an Italian botanist. Greenhouse herbs.
alpinus	alpine

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Alsophila	Gr. grove loving. Tree ferns.	Androsace	Small, tufted, alpine plants.
Alstonia	After Dr. Alston, prof. of botany. Trees.	<i>androsaceus</i>	Androsace-like
Alstroemeria	After Baron Alstroemer. Tuberos rooted perennials.	Anemone	hardy plants; "Windflower"
<i>altaicus</i>	of the Altai Mts., Siberia	<i>anemoneflorus</i>	Anemone flowered
<i>alternans</i>	alternating	<i>anemonefolius</i>	Anemone leaved
<i>alternifolius</i>	alternate leaved	Anemonella	woodland plants
<i>alternus</i>	alternating, alternate	Anemonopsis	Perennial plant, native of Japan.
<i>althaeoides</i>	Althaea-like, hollyhock-like	<i>anethifolius</i>	Anethum leaved
<i>altissimus</i>	very tall, tallest	Anethum	"Dill" and "Fennel"
<i>altus</i>	tall	<i>aneurus</i>	nerveless
<i>alumnus</i>	well nourished, strong	Angelica	ornamental herbs
<i>alutaceum</i>	like soft leather	Angiopteris	greenhouse ferns
<i>alyssoides</i>	Alyssum-like	<i>anglicus</i>	English, of England
<i>amabilis</i>	lovely	Angraecum	Orchids
<i>amaranthoides</i>	Amaranth-like	<i>angularis</i>	angular, angled
<i>amaricaulis</i>	bitter stemmed	<i>angulosus</i>	angled, full of corners
<i>amarus</i>	bitter	<i>angustifolius</i>	narrow leaved
<i>ambiguum</i>	ambiguous, doubtful	<i>angustus</i>	narrow
<i>amblyodon</i>	blunt toothed	Anigozanthos	Australian sword lily
<i>ambrosioides</i>	Ambrosia-like	<i>anisatum</i>	anise scented
<i>amelloides</i>	Amellus-like	Anise	a medicinal annual
<i>americanus</i>	American	<i>anisodorus</i>	anise odor
Amesiae	After Mary S. Ames of N. Easton, Mass.	<i>anisophyllus</i>	unequal leaved
<i>amethystinus</i>	amethystine, violet colored	<i>annotinus</i>	year old
<i>ammophilus</i>	sand loving	<i>annularis</i>	annular, ringed
<i>amoenus</i>	charming, pleasing	<i>annuus</i>	annual
<i>amphibius</i>	amphibious, growing on land or in water	<i>anomalus</i>	anomalous, unusual
<i>amplexicaulis</i>	stem clasping	<i>anopetalus</i>	erect petaled
<i>amplexifolius</i>	leaf clasping	Anopteris	Greenhouse shrub
<i>ampliatus</i>	enlarged	<i>antarcticus</i>	from Antarctic regions
<i>amplissimus</i>	very large or ample	Antennaria	Field herbs
<i>amplus</i>	ample, large	Anthemis	Annual, biennial and perennial plants
<i>amurensis</i>	of the Amur River, N. E. Asia	<i>anthemoides</i>	Anthemis-like
<i>amygdaliformis</i>	almond shaped	Arthericum	Non-bulbous liliaceous plants
<i>amygdaloides</i>	Almond-like	Antholyza	Cormous plants
<i>anacanthus</i>	without spines	<i>anthopogon</i>	Bearded flowers
<i>anacardioides</i>	Anacardium-like	<i>anthosphaerum</i>	round flowered
Anacardium	genus of trees and shrubs	Anthoxanthum	Aromatic grasses
Anagallis	Annual, biennial and perennial plants.	Anthriscus	Chervil
Ananas	tender plants	Anthurium	Hothouse foliage plants
Anaphalis	hardy border plants	Anthyllis	Perennial herbs (Vetch)
Anastatica	"Resurrection Plant"	Antiaris	Trees or shrubs from East Indies
<i>anatolicus</i>	of Anatolia (Asia Minor)	Antidesma	Tropical trees
<i>anceps</i>	two-headed, doubtful	Antigonon	Tender climbers
Anchusa	Annual, biennial and perennial plants.	<i>antillaris</i>	of the Antilles, West Indies
<i>andicolus</i>	native to the Andes	<i>antipodum</i>	of the Antipodes
Andromeda	small evergreen shrubs	<i>antiquorum</i>	of the ancients
		<i>antiquus</i>	ancient
		Antirrhinum	Snapdragon
		<i>antirrhiniflorus</i>	antirrhinum-flowered
		<i>antirrhinoides</i>	snap-dragon-like

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<i>anwheiense</i>	from Anwhei	<i>Araucaria</i>	large Australian or South American evergreen tree
<i>apenninus</i>	of the Apennines (Italy)	<i>arborescens</i>	tree-like
<i>aperantum</i>	limitless	<i>arboreum</i>	tree-like
<i>apertus</i>	uncovered, bare	<i>arbusculus</i>	like a small tree
<i>apetalus</i>	without petals	<i>Arbutus</i>	woody plants, trees or shrubs
<i>Aphananthe</i>	ornamental, deciduous tree	<i>arbutifolius</i>	arbutus leaved
<i>Aphelandra</i>	Tropical, American evergreen	<i>Archontophoenix</i>	Palms
<i>aphyllus</i>	leafless	<i>arcticus</i>	arctic
<i>apiculatum</i>	tipped with a point	<i>Arctium</i>	coarse perennials (Burdock)
<i>apifera</i>	bee-bearing	<i>Arctostaphylos</i>	evergreen shrubs
<i>apiifolius</i>	apium-leaved	<i>Arctotis</i>	African plant
<i>Apios</i>	hardy twining herbs	<i>Arctotus</i>	prostrate shrub
<i>Apium</i>	celery	<i>Ardisia</i>	trees and shrubs
<i>Aplectrum</i>	Orchid	<i>Areglia</i>	hothouse plants
<i>Apocynum</i>	native herbs	<i>Arenaria</i>	annual and perennial herbs
<i>apodectum</i>	acceptable	<i>arenarius</i>	of sandy places
<i>apodus</i>	footless	<i>Arenga</i>	spineless palms
<i>Aponogeton</i>	aquatics	<i>areolatus</i>	pitted
<i>appendiculatus</i>	appendaged	<i>Arethusa</i>	tuberous orchids
<i>applanatus</i>	flattened	<i>Argemone</i>	prickly garden annuals
<i>applicatus</i>	joined, attached	<i>argentatus</i>	silvery
<i>Aporocactus</i>	vine-like cactus	<i>argenteo-guttatus</i>	silvery spotted
<i>apricus</i>	uncovered	<i>argenteus</i>	silvery
<i>apterus</i>	wingless	<i>argillaceus</i>	of clay
<i>aquaticus</i>	watery	<i>argipeplum</i>	white robed
<i>Aquilegia</i>	hardy perennial plants	<i>argophyllus</i>	silvery leaved
<i>aquilegifolius</i>	aquilegia-leaved	<i>argutus</i>	sharp toothed
<i>aquilinus</i>	eagle-like	<i>argyraeus</i>	silvery
<i>arabicus</i>	Arabian		
<i>Arabis</i>	small, perennial or annual plants		
<i>Arachis</i>	peanut		
<i>arachnoides</i>	spider-like, cobwebby		
<i>Aralia</i>	large herbs, shrubs or small trees		
<i>araliaefolius</i>	aralia-leaved		
<i>araliaeforme</i>	aralia-like		

1 1 1

Buddleia was named for Adam Buddle, an English botanist. Another spelling of the generic name is Buddleja.

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## Notes and Comments

(Continued from Page 26)

2, 3 and 4 at the Civic Auditorium with Mrs. Orrin Hale as chairman.

The Arboretum will participate in this Show and plans are underway for an unusual exhibit featuring Rhododendrons and Azaleas. The annual University of Washington Arboretum Rhododendron Show sponsored by the Arboretum Foundation, which is also usually held in May, will therefore be postponed until next year.

1 1 1

### SOME ARBORETA AND BOTANIC GARDENS OF THE EASTERN U. S. A.; FALL, 1948

Story on Page 15.

#### NOTES

1. See Summer 1948 Bulletin, "The Morton Arboretum" by E. L. Kammerer.

2. For further details see "The Arnold Arboretum of Harvard University," by Dr. Sax in our Bulletin, Fall 1947.

3. See the detailed account in our Fall 1948 Bulletin by Miss M. Lancaster.

4. See the detailed account by Mr. Wister in our Bulletin, Spring 1948.

5. For an account of these Azaleas, see Mrs. O. B. Thorgrimson's article in the Summer 1948 Bulletin.

6. See Winter 1947 Bulletin, "Missouri Botanic Gardens," by Dr. George T. Moore.

7. See "The Arboretum Pinetum After Twenty Years," in Missouri Botanical Garden Bulletin, XXXII (10), Dec. 1944.

1 1 1

*Andromeda Polifolia* is a little evergreen belonging to the Ericaceae family valuable for planting with quite dwarf rhododendrons. It has narrow, gray leaves and clear pink, bell-shaped flowers similar to many other plants of the same family. It likes a peaty or sandy, moist soil.

## The R. H. S. Society's Gardens

(Continued from Page 7)

try. The results of such investigations are published in due course in the Society's *Journal* or in other scientific periodicals.

The Laboratory is also the headquarters of the Wisley School of Horticulture, and contains well-equipped classrooms to meet the requirements of the courses. Student Gardeners are admitted on two-year diploma courses, and receive training in practical work and in the sciences having a bearing on horticulture. At the present time the syllabus is modified to cover a series of one-year courses organized by the Ministry of Agriculture for men whose horticultural training has been interrupted by military service.

The gardens are maintained primarily for the use of Fellows of the Society, many of whom are regular visitors; and many large parties, representing affiliated horticultural and scientific societies, meet here during the summer. Lastly, it need hardly be said that a cordial welcome is extended to visitors from overseas. We are glad to receive them and to discuss with them our many common interests, and we hope that the pleasure they derive from their visits is as great as ours.

1 1 1

The Unit Council of Arboretum Units will hold a Plant Sale at the Arboretum on Thursday, March 24 starting at 2 p.m. Many rare plants will be offered for sale. The public is invited. (Anyone wishing to contribute unusual plants may contact Mrs. Loren Grinstead, Chairman, Medina, Wash., or the Arboretum Foundation Office.)

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## Preliminary Notes on Frost Damage

(Continued from Page 36)

*leum*, and *Penstemon corymbosus*. Some at least of these will probably recover by fresh growth from the main stems.

Slightly damaged, chiefly to the ends of the stems, are the prostrate *Ceanothus griseus* var. *horizontalis*, and *C. cuneatus*, the large specimen of *Fremontia californica*, the dwarf myrtle, *Myrtus communis* var. *tarentina*, grey-foliaged *Senecio maritimus*, and the creeping periwinkle from S. Europe, *Vinca difformis*. S. African *Protea* species, protected by glass frames and bracken, have had their leaves browned in some cases where they touched the glass, but most of the plants appear likely to pull through.

Evergreen plants unharmed include six other species of *Ceanothus* (*Lemmonii*, *Masonii*, and *cordulatus* amongst them), *Fabiana imbricata*, the beautiful New Zealand *Hebe Hulkeana*, and two species of *Pittosporum*, *P. Buchananii* and *P. Tobira*, outside the office. In the lath-house those apparently killed include the evergreen *Peumus Boldus* from Chile, *Pomaderris elliptica* from New Zealand, and the S. African conifer *Widdringtonia dracomontana*.

Badly damaged are the climbing *Berberidopsis corallina* and *Mitraria coccinea*, both natives of Chile, *Escallonia montevidensis*,

*Rhododendron scabrum*, and *Widdringtonia Schwartzii*, but it is hoped that all these may finally survive.

Amongst the less affected—mostly with tips of shoots killed—are *Embothrium coccineum*, the Chilean fire-bush, the hybrid *Eucryphia Nymansay*, *Hoheria glabrata* var. *Osbornei*, the Californian evergreen Toyon, *Photinia arbutifolia* var. *macrocarpa*, the soap-bark tree from Chile, *Quillaja Saponaria*, and *Tricuspidaria lanceolata* from the same country.

All of these are of course young plants, generally 1½-2 years old, and most evergreen or partially so. Damage to deciduous plants in this climate is unlikely.

1 1 1

## Aquatic Species of the Grand Coulee, Washington

(Continued from Page 25)

76. Tufted Loosestrife (*Lysimachia thyrsiflora*). Common in the low wet ground of the Cascades Canyon.
77. Bittersweet Nightshade (*Solanum dulcamara*). Common along the fresher waters.

As a matter of record, specimens of the aquatic plants in this list, as well as those of the first list (cited above) are deposited in the herbarium of the University of Washington, at Seattle.

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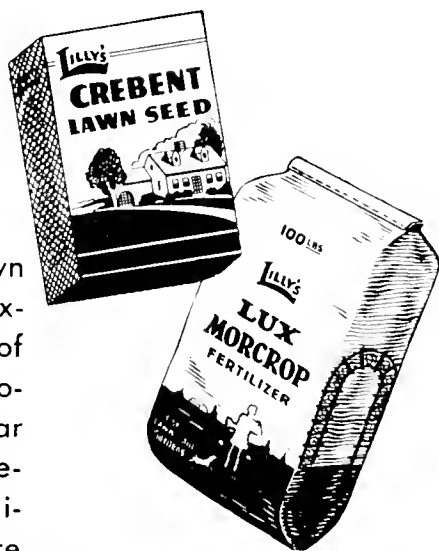


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